

VOLUME TWENTY-FIVE    NINETEEN SIXTY-ONE

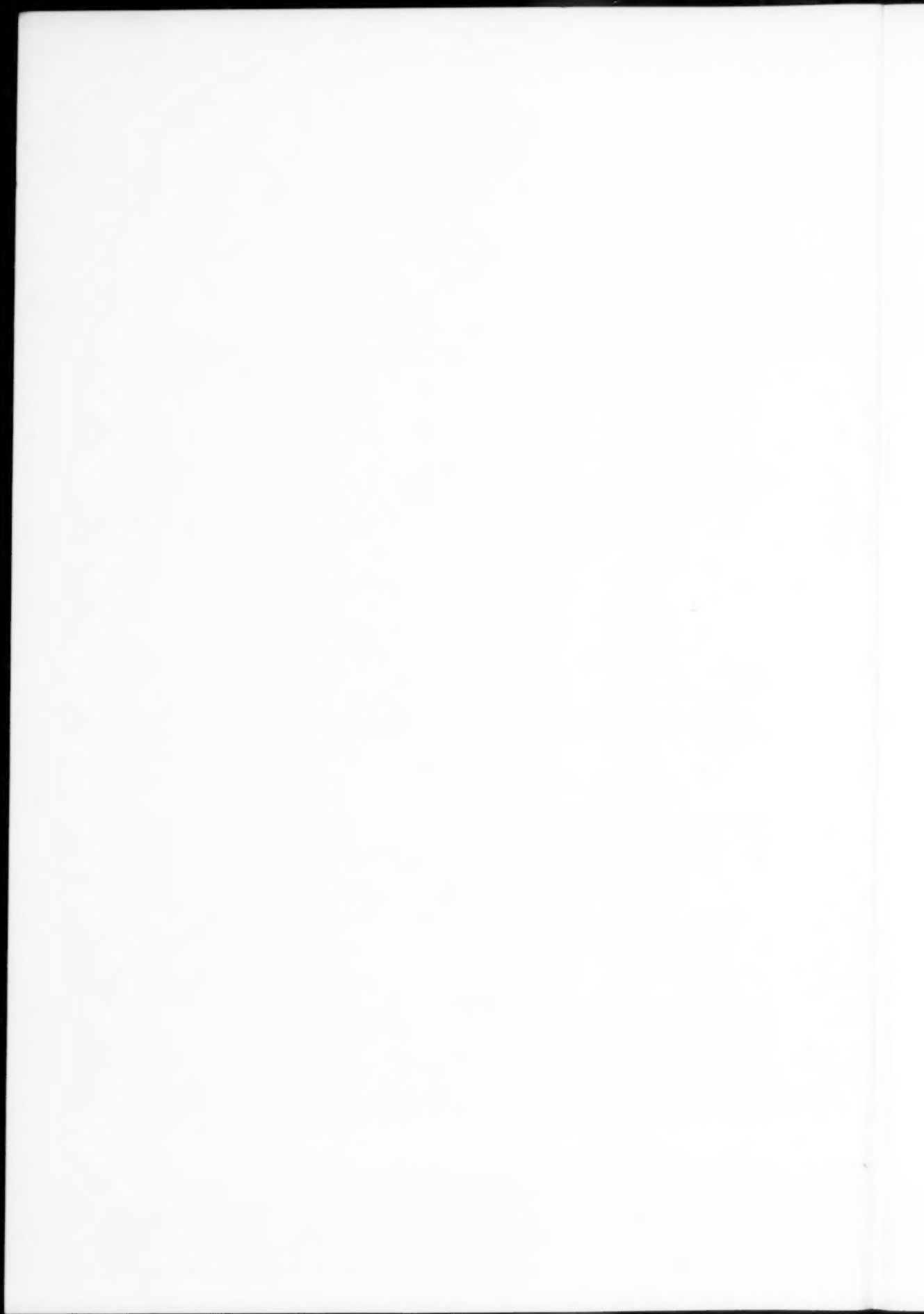
**AMERICAN  
JOURNAL OF  
PHARMACEUTICAL  
EDUCATION**



**25**  
ANNIVERSARY YEAR

THE OFFICIAL PUBLICATION OF  
THE AMERICAN ASSOCIATION OF  
COLLEGES OF PHARMACY

 **SPRING**





# AMERICAN JOURNAL of PHARMACEUTICAL EDUCATION

## AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY 1961-1962

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## Feature Section

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*Editor's Note: The following four articles were written at the invitation of the editor to continue the established series on new physical facilities for pharmaceutical education.*

H. G. HEWITT\*

### PHARMACY RESEARCH INSTITUTE

### UNIVERSITY OF CONNECTICUT

As you read this article, the pharmacy research institute of the University of Connecticut will have been in operation for more than a year. The realization of this research center was aided by a Health Research Facility Grant under Public Law 835. The ground was broken in December of Nineteen Hundred Fifty Eight, and the building occupied in the early Spring of Nineteen Hundred Sixty.

The first paper involving research carried on solely in this building has been accepted and will be published this spring.

#### The Structure

This facility, which is the first pharmacy research institute in the United

States, is dedicated to basic and applied research involving problems of public health and proposes to develop research programs in cooperation with other departments of the University of Connecticut, industrial concerns, professional organizations, and state and federal agencies.

Fortunately there was room adjacent to our present school of pharmacy so that we have a forty foot passageway connecting the first floors of the two buildings. This is a distinct convenience for research workers and staff.

The institute consists of a square, modern, three-story red-brick structure.

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\*Dean, School of Pharmacy, University of Connecticut and Director, Pharmacy Research Institute

The building is so designed as to be utilitarian, with each area planned to serve most efficiently for the purpose designed—research. The modern construction has supporting columns to the outside of the building so as to permit inside walls that are free of obstructions for easy placement of furniture and equipment.

The basement contains equipment and chemical storage rooms, together with a complete machine shop and glass working area. The first floor will be devoted to pharmaceutical research and development; the second floor to general research; and the third floor to research in pharmacognosy, phytochemistry and pharmacology.

The institute represents an important expansion of the present program of research carried on by the University of Connecticut School of Pharmacy. The wing of the pharmacy school proper adjacent to the institute makes available to both centers a complete isotope suite for research in all areas of pharmacy involving the use of radioactive materials. This suite is made up of an instrument and counting room, a decontamination room, hot laboratory, radiochemistry, radiopharmacy, radiocology, and radio-cognosy laboratories. Pharmaceutical chemistry will continue to be housed in this wing in a large general research area accommodating adequate space for eight researchers plus six special project research areas. On the third floor of the wing are located complete animal quarters and four special project areas for research in pharmacology. An experimental greenhouse, an instrument analysis laboratory, a photography laboratory, and a library complete the area in the present pharmacy school devoted to research. The combined area of the institute and the school of pharmacy dedicated solely to research is approximately 30,000 square feet.

### **First Floor**

This floor of the institute contains the pharmaceutical research and development areas.

**Testing and Control Laboratory.** This area is equipped for carrying on analysis and quality control of the finished pharmaceutical.

**Aerosol Laboratory.** Here are found complete facilities for cold and pressure filling, providing space for research and study in the formulation of medicinals to be dispensed as aerosol dosage forms.

**Freeze Drying and Sterile Products Areas.** These areas are designed for work under aseptic conditions, air conditioned with humidity control, stainless steel working surfaces, smooth wall and ceiling surfaces, ceramic tile floors, ultraviolet lamps in the ceiling. Here are located the freeze dryer, positive pressure enclosures, autoclave, ampul washer, sterilizing oven, ampul filling and sealing equipment, and a still for pyrogen-free water.

**Tablet Coating and Compression Areas.** These rooms are air conditioned at 40 per cent relative humidity, tile floors with center drain, controlled exhaust and hot air system above pan coating units. Pan coating units are of the bench type, with a press coating machine located in the compression area. The compression area also contains single and multiple station rotary presses.

**Stability Control Area.** This area is also air conditioned and is used for the study of the stability of pharmaceuticals under accelerated conditions of humidity, light and temperature.

**Non-Sterile Liquid Room.** This area is dedicated to general manufacturing. It is equipped with tilting steam-jacketed kettles, open steam-jacketed kettles, ointment filling and crimping equipment, a two-stage laboratory homogen-

izer, a three-roll ointment mill and colloid mills of various designs.

**Mixing and Milling Area.** This laboratory, together with the non-sterile liquid room and tableting areas, is equipped with ceramic tile floor with center drains, desk units on ball feet, and a Strahman hose station. Equipment and floors can be hosed down with hot or cold water and steam from the station. A stainless steel sink in each room provides additional facilities for washing equipment. The mixing and milling area, being a dusty operation, has been designed to overcome the cost and inflexibility of a dust collector at each unit. A dust hood, connected to a dust collection unit, is located at one end of the laboratory. It has controlled air flow and a power panel to accommodate each piece of equipment in the room. The mixers, oscillating granulator, Fitz mill, spray dryer and other pieces of equipment needing dust collection can be wheeled to the hood.

### Second Floor

**Special Project Laboratories.** This floor has two two-man and two one-man special laboratories for individual research projects.

**Ultrasonics Laboratory.** This area is well-equipped with ultrasonic equipment of various types. This area is dedicated to the study of application of ultrasonic energy to pharmaceutical and chemical problems.

**General Research Laboratory.** This laboratory will provide an area for general research in all areas of pharmacy. Twelve researchers can easily be accommodated in this large laboratory.

**Shower and Locker Room.** To offer relief from the dusty operations of manufacturing processes, the staff is provided with a modern shower and locker room.

### Third Floor

**Pharmacology Laboratory.** This air-conditioned area provides space for continuing research being carried on in biodynamics and other studies in animal behavior under the influence of various drugs.

**Animal Room.** Adjacent to the pharmacology laboratory is a modern-equipped, tiled area to fill the needs of additional animal quarters over and above those now present in the pharmacy building. There are plans now under way to further increase animal quarters by the erection of a large penthouse on the roof for the quartering of animals.

**Sterile Room—Cold Room—Autoclave.** This sterile room complete with a positive pressure enclosure and walk-in incubator, together with the cold room for storage of media, etc., and a large autoclave is an accessory area for the work with the fermentation pilot plant.

**Chromatography and Microscopy Laboratory.** Well-equipped, this room will be used for both microscopy and the important field of chromatography.

**Fermentation Area.** This room holds a 150 gallon pilot-plant fermentation tank for research in the field of fermentation on a scale intermediate between laboratory and production amounts. Studies will be continued in the field of antibiotics and ergot culture.

**Pharmacognosy Research Area.** This large laboratory is being used as an area for phytochemical research. Two controlled temperature shaker rooms adjoining this laboratory serve for growth studies on submerged culture.

**Sterilizer Area.** Off the corridor is a large new orthomatic Wilmot Castle Sterilizer. This is so equipped that it will accommodate the trays directly from the cart.

### **The Staff**

This institute is designed to accommodate easily thirty-six research workers. This number can, without undue crowding, be expanded to accommodate another ten workers. The staff at the present consists of twenty-three full- and part-time research workers.

The product formulation and general pharmacy areas occupying the first and second floors are coordinated by H. M. Beal and D. M. Skauen.

The work in biodynamics and general pharmacology is coordinated by J. G. Adams and M. H. Malone.

The phytochemical and general pharmacognostical research is directed by W. J. Kelleher and A. E. Schwarting.

The institute is under the direction of H. G. Hewitt.

At the present time two postdoctoral workers are carrying on research sponsored by U.S. Army Contracts. Dr. A.

Rother was trained at the University of Munich as a biochemist, while Dr. B. Wesley-Hadzija is a biochemist from the University of Zagreb, Yugoslavia.

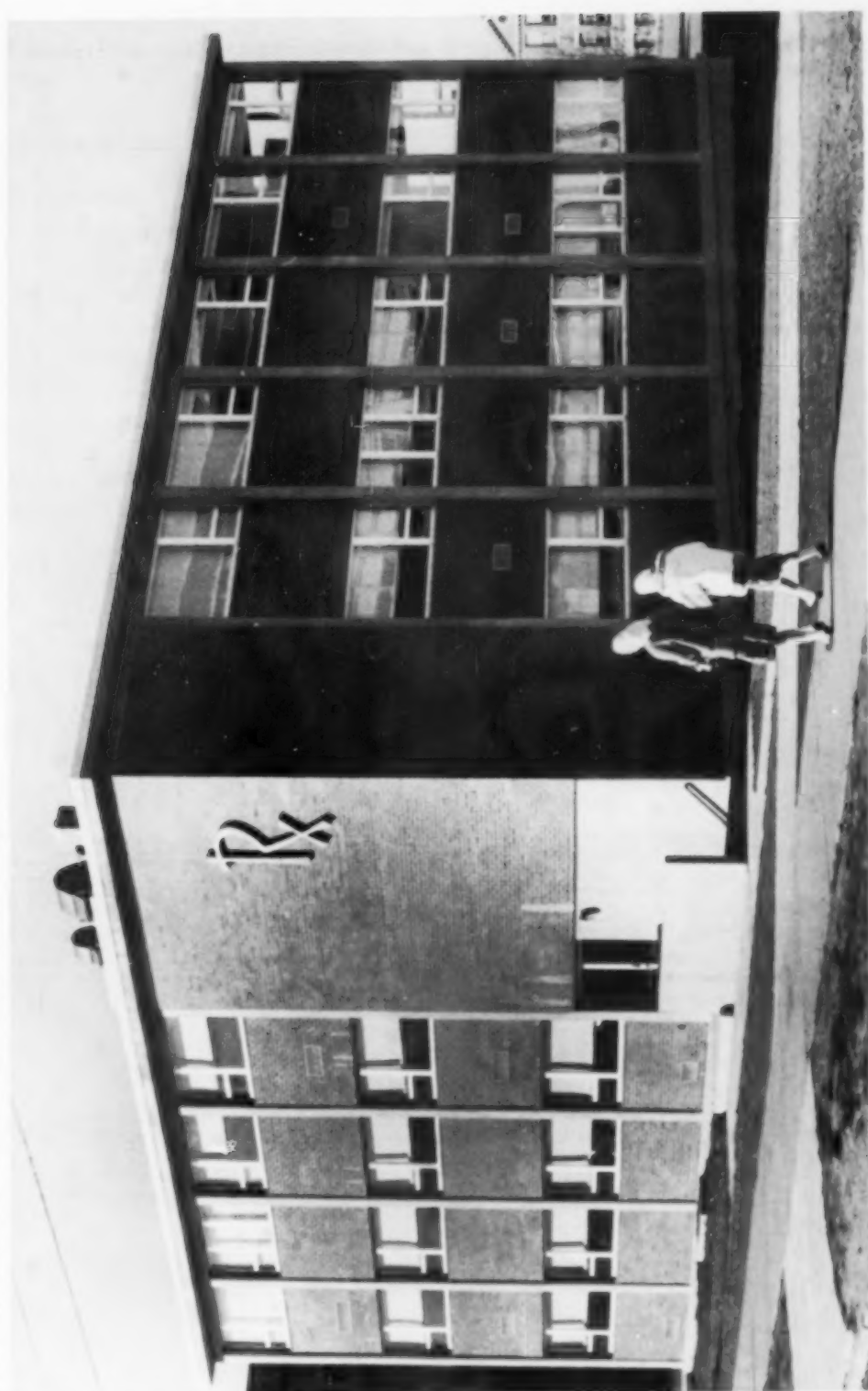
The other research assistants and associates in the institute are W. Amsden, R. Blomster, R. Buccino, S. Burton, R. Cohn, D. Gold, G. Jackson, M. Luckens, D. McQuinn, L. Pacifici, P. Ragozzino, R. Robichaud, L. Schramm, R. Sharma, and M. Van Dyke.

Even though this institute is but a year old there are plans on the drawing board for the addition of added facilities to accommodate a greatly expanded program proposed in biodynamics.

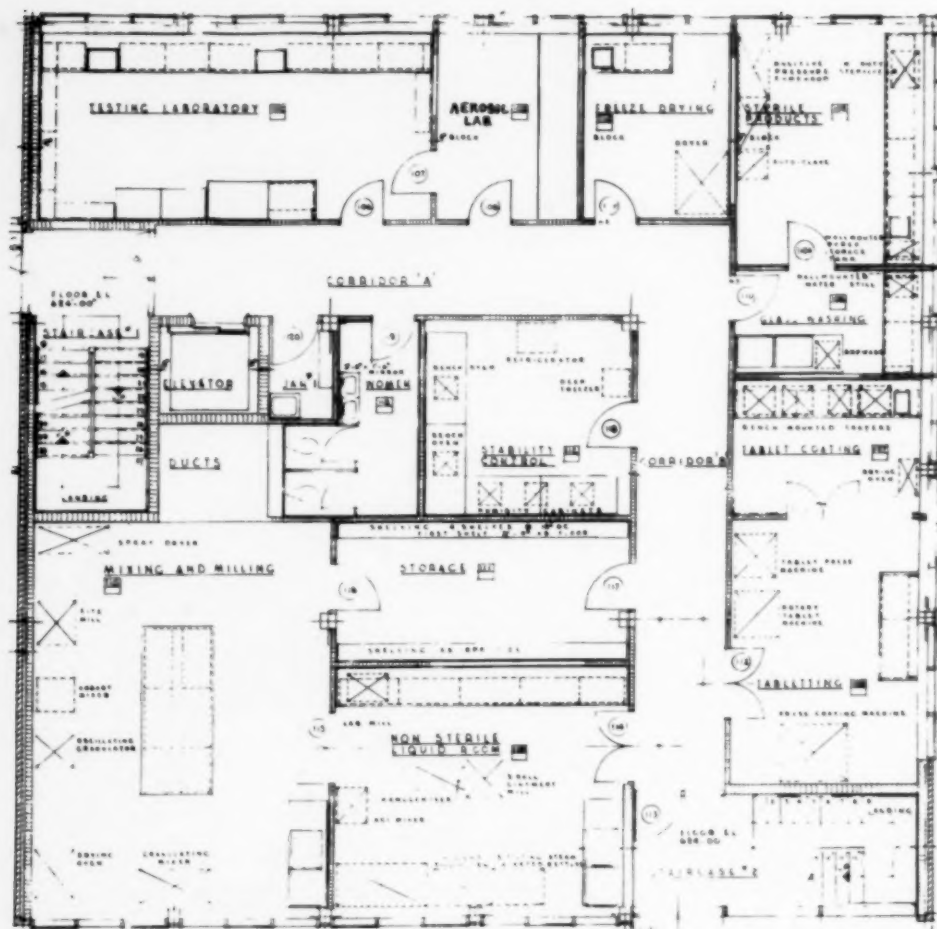
We invite any reader in the Storrs area to visit us and to view this first of a number of research institutes in pharmacy which are certain to follow. We are proud of this area and wish to share this pride in this unique institute with you.



**Fig. 1**  
**Pharmacy Research Institute, University of Connecticut**

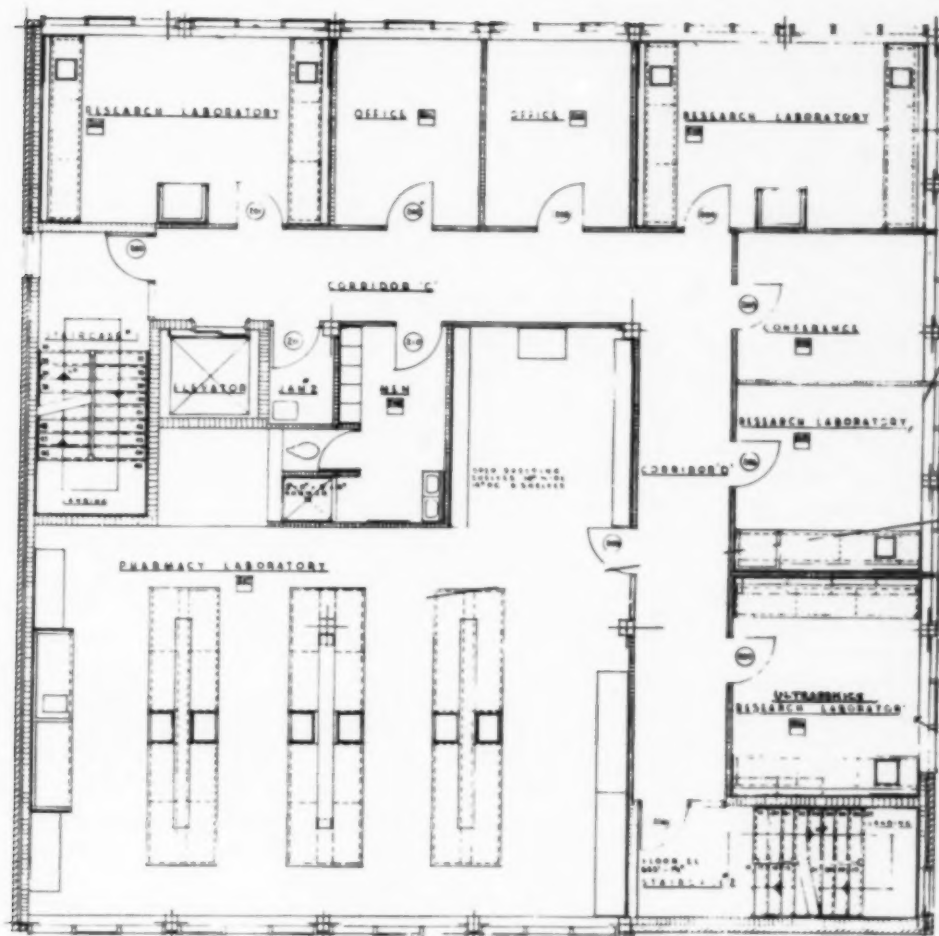


**Fig. 2**  
**First Floor, Pharmaceutical Research and Development, Pharmacy Research**  
**Institute, University of Connecticut**

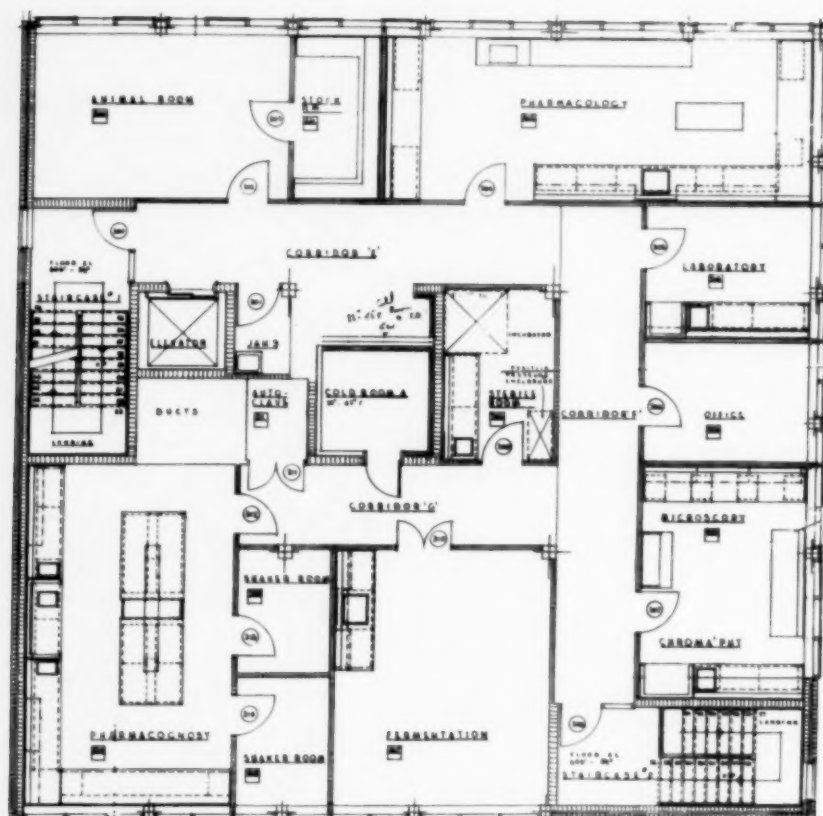




**Fig. 3**  
**Second Floor, General Research, Pharmacy Research Institute, University of Connecticut**



**Fig. 4**  
**Third Floor, Pharmacognosy and Pharmacology, Pharmacy Research Institute,**  
**University of Connecticut**



## DUNNING HALL

In 1954, the University of Maryland received an appropriation of \$575,000 for the initial phase of a new building for the school of pharmacy. This construction enabled the transferral of the departments of anatomy and physiology, pharmacognosy, pharmacology, pharmacy, and pharmacy administration and the administrative offices into a new facility. The ten-year building plan of the University includes the addition of three floors to the building to provide new facilities for the department of pharmaceutical chemistry, new lecture and recitation rooms, and for the expansion of some of the present departments now in the new building. The department of microbiology is shared with the school of dentistry in another building.

Early in 1958 the building was completed and appropriately named after Dr. H. A. B. Dunning, a distinguished alumnus of the school of pharmacy. Appropriate dedication ceremonies were held on December 4, 1958, with speakers for the occasion including Dr. H. A. B. Dunning; Dr. Louis C. Zopf, president of the American Association of Colleges of Pharmacy; the Honorable Theodore R. McKeldin, governor of the State of Maryland at that time; Dr. Wilson H. Elkins, president of the University of Maryland, and Mr. Charles P. McCormick, chairman of the Board of Regents. A bronze plaque with a bust of Dr. Dunning and with the notation "In recognition of his outstanding leadership and devotion to the profession of pharmacy and loyal service to

the University of Maryland" was placed in the foyer of the building through the generosity of the Alumni Association of the University of Maryland School of Pharmacy, the Baltimore Metropolitan Pharmaceutical Association, and the Maryland Pharmaceutical Association.

Dunning Hall, a structure one hundred and ten by one hundred feet, built of reinforced concrete, faced with brick and ornamented with limestone and granite, consists of a basement and two floors. The basement provides adequate area for the teaching of manufacturing pharmacy, an air-conditioned temporary lecture room, a temporary snack bar, a temporary bookstore, and locker rooms for students. The first floor accommodates the administrative offices, individual offices for the staff members, a small museum, a room for a model drug store, two pharmacy teaching laboratories and a stock room, and a laboratory for pharmaceutical research. The second floor provides a teaching laboratory, a stock room, a research laboratory, and individual offices for each of the departments of anatomy and physiology, pharmacognosy and pharmacology.

All corridors and laboratories are walled with ceramic tile to a height of four feet. All plumbing and ventilating ducts are exposed, except in the administrative offices. Fluorescent lighting is used throughout the building. On the second floor, an automatic water

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\*Dean, School of Pharmacy, University of Maryland

still and storage tank, which supplies distilled water to all the laboratories, has been installed on a temporary floor provided in the area of the second elevator shaft. The administrative offices and the temporary lecture room have been air-conditioned. There are no windows in the basement so that the rest of the basement is ventilated by forced air. Since the completion of Dunning Hall, there has been constructed on the Baltimore Campus of the University (which includes the schools of dentistry, law, medicine, nursing, pharmacy, and the university hospital) a Baltimore Union Building which provides a bookstore as well as lounge and cafeteria facilities for all the students on the Baltimore campus. The student lounge and cafeteria in the basement of Dunning Hall will be converted into a radioisotope laboratory and provide additional space for pharmaceutical manufacturing. The temporary bookstore in the basement has been assigned to the student staff of the yearbook. The temporary lecture room will eventually be converted to pharmaceutical manufacturing and/or stock rooms when the three additional floors of the building have been added.

The first and second floors of the building are devoted almost entirely to laboratories and offices for the teaching staff, except for the administrative offices on the first floor. Each laboratory has been arranged to accommodate a maximum of 40 students per sec-

tion. Both the anatomy and physiology laboratory and the pharmacology laboratory include a special room with hood to permit the smoking of kymograph paper. The animal room on the second floor, with a quarry tile floor to permit easy cleaning, includes a compartment with a tank for steam-sterilizing any cage in the animal room. These animal room facilities are shared by the department of anatomy and physiology and the department of pharmacology.

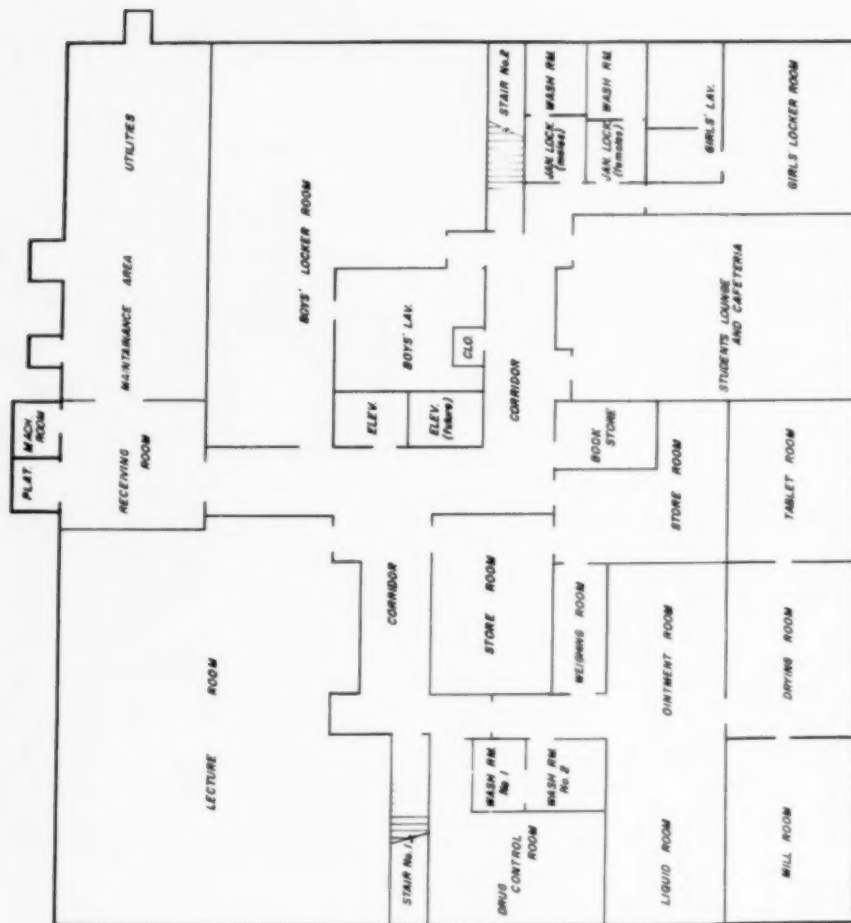
An additional appropriation of \$120,000 was received for equipping the building. All of the laboratory furniture is wood. Some of the better laboratory furniture in the old building was refinished and renovated, particularly in the departments of pharmacognosy and pharmacy, and brought over to the new building. The manufacturing laboratories have been provided with the usual standard-sized equipment such as would ordinarily be found in a teaching laboratory.

There are three entrances to the first floor of the building, namely, the foyer entrance on the front, and two side entrances near the stairways leading to the other floors. There is one automatic passenger elevator which can be used for freight plus the shaft for a second elevator when the building is expanded to include more floors. The receiving room in the basement is adjacent to a platform lift which permits supplies and equipment to be brought down from the street level.

Fig. 1  
Dunning Hall, University of Maryland



**Fig. 2**  
**Basement Plan, School of Pharmacy, University of Maryland**



**Fig. 3**

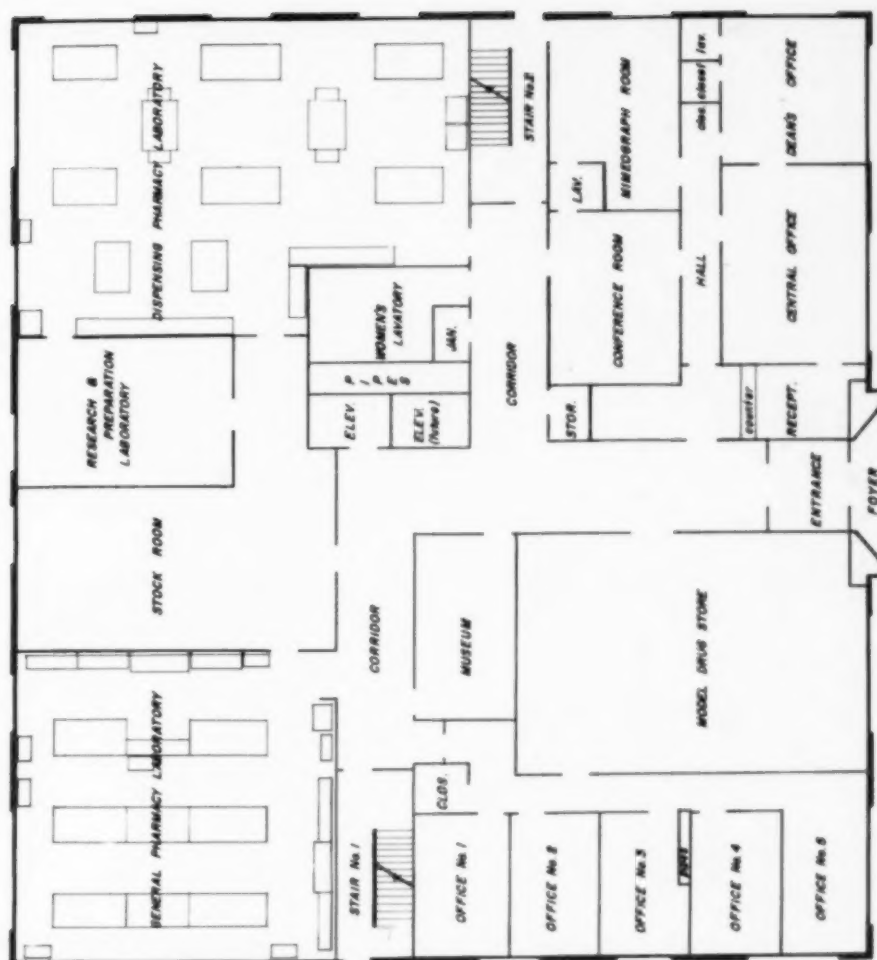
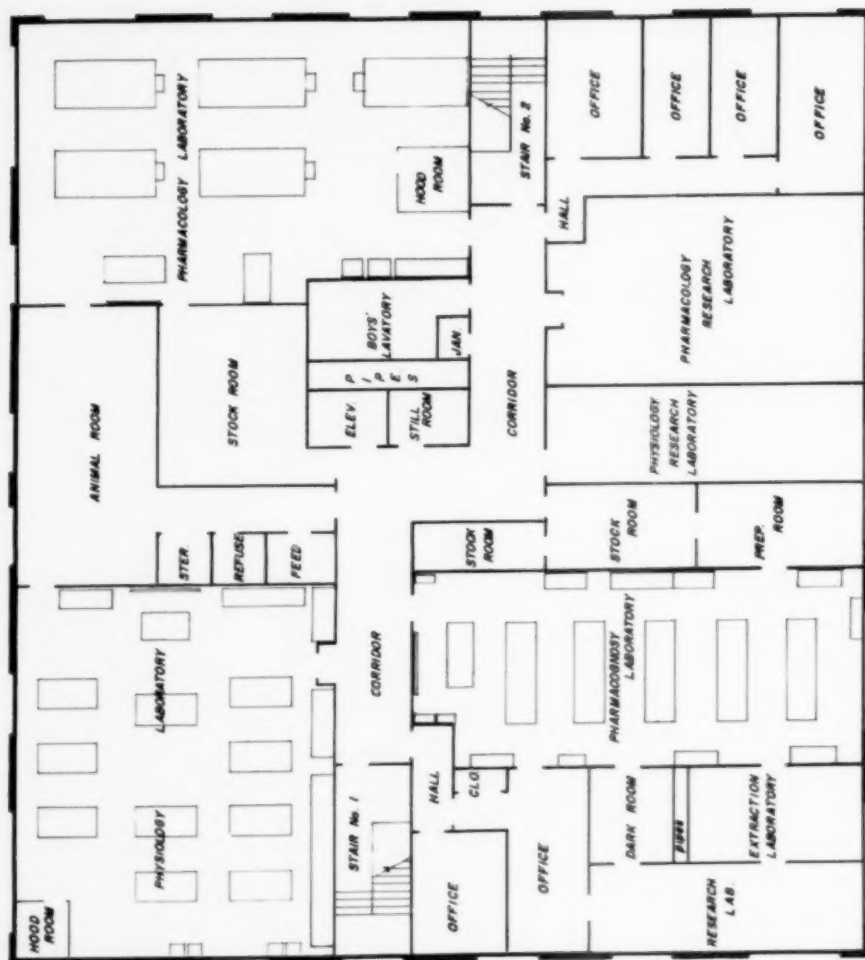




Fig. 4  
Second Floor Plan, School of Pharmacy, University of Maryland





**Fig. 5**  
**General Pharmacy Laboratory, University of Maryland**



**Fig. 6**  
**Dispensing Pharmacy Laboratory, University of Maryland**



**Fig. 7**  
**Pharmacy Manufacturing, Liquid and Ointment Rooms, University of Maryland**



**Fig. 8**  
**Pharmacognosy Laboratory, University of Maryland**



**Fig. 9**  
**Physiology Laboratory, University of Maryland**



**Fig. 10**  
**Pharmacology Laboratory, University of Maryland**



## THE UNIVERSITY OF MICHIGAN PHARMACY RESEARCH BUILDING

The University of Michigan research programs in pharmacy, including product development and physical pharmacy, and in pharmacognosy were housed in a new Pharmacy Research Building in September, 1960. The building (Fig. 1) was formally dedicated on December 1 at a program in which representatives of the National Institutes of Health, the pharmaceutical industry, and the University participated. These groups, together with other friends of the college, provided the funds for constructing and equipping the building.

Statistical data are itemized in Table I and a floor-by-floor list of laboratories and service rooms is given in Table II. No class rooms are included in the building. Figures 2-10 also serve to give further information on the structure, so that the text of this article will be limited to brief discussion of some of the types of research projects being carried on in the building.

Research in product development and physical pharmacy at Michigan is pre-eminently basic. In most instances it involves physico-chemical studies of

solids and of solutions. The research facilities of the college, however, are also available for the study of specific problems in product development under sponsorship of members of the pharmaceutical industry. Such sponsored research may be a relatively long term study, it may involve the use of equipment not otherwise available to a small manufacturer, or it may serve to supplement the efforts of a concern in process of expanding its own research laboratories.

A number of basic studies in rheology are currently being carried on. Flow characteristics of powder beds under compression, of gelatin films, and of suspensions of insoluble medicinal chemicals in aqueous solutions of gums or of cellulose derivatives are included here. In the last named type, sedimentation of suspensions is related to rheological characteristics with particular attention to non-Newtonian systems.

Another series of basic investigations is concerned with solubility of model

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\*Professor of Pharmacognosy, College of Pharmacy, University of Michigan



compounds and of drugs that exist in polymorphic forms of low solubility. Dissolution rates are studied by means of spectrophotometric analysis. In some instances, dependence of dissolution rate on crystal form is studied utilizing a completely equipped polarizing microscope.

A problem of more obvious practical application involves the development of an automatic method for coating tablets by the classical pan-coating procedure. Investigation of the diffusion of moisture into and out of a tablet during the process is undertaken, as are studies of the correlation of temperature, humidity, velocity of air, and machine variables throughout the process.

Such studies as these usually involve the use of standard laboratory equipment provided in the Pharmacy Research Building as in any well-equipped pharmaceutical research laboratory. Frequently, additional equipment of a more specialized nature is needed, and the pharmacy research laboratories at Michigan are provided with such special equipment as a recording thermobalance, sorptometer, compression coaters, and electronic analog computer. The computer permits simulation of certain physical systems enabling simultaneous study and correlation of a number of variables. For example, relationships among such factors as rates of dissolution, absorption from the intestine, distribution via the blood, distribution among tissues, inactivation within tissues, and excretion of an orally administered drug can be studied by electronic means.

Not infrequently equipment needed for a research project must be designed and constructed locally. Research in pharmacy has involved the building of an automatic recording viscometer, a tester for recording tensile strength in gelatin films, a recording laboratory press for relating degree of compression

to pressure exerted on powder beds, and a continuously recording density device for measuring the sedimentation rate of suspensions. The density device has also been adapted to measuring uptake or release of moisture from coated tablets at controlled temperatures and humidities.

The fourth floor of the building is devoted to research in pharmacognosy, which also has access to such units as the radioactive laboratory on the second floor. Facilities of the fourth floor provide for phytochemical investigations, growth of higher plants under carefully controlled conditions, and fermentation studies. A two-room low-temperature laboratory is so arranged that the main area can be maintained at the usual temperatures of refrigerators while a central separate chamber can be maintained at temperatures as low as  $-20^{\circ}\text{C}$ .

The rooms designed for growth of higher plants under controlled conditions are not yet completely equipped. Two rooms will be equipped to enable environmental control with respect to temperature, light, and humidity, and further to permit automatic programming for each of these factors for any time interval desired. Each plant growth room will have an adjacent dark room in which programming for temperature and humidity can be arranged. A plant preparation room completes this five-room unit. Electronic equipment for the unit will be housed in a penthouse, with recording panels located in the plant preparation room.

A long-range study of mushrooms, chiefly agarics, is being undertaken in cooperation with mycologists of the University Herbarium. Collection and identification of the fungi is largely in the hands of the mycologists, with drying, extraction and phytochemical studies done in the pharmacognosy research laboratories. A major objective is to

isolate and identify any alkaloids present. Total fat analysis is also being undertaken. Data from these studies may prove to be of value in phylogenetic judgments on this group of plants, and the alkaloids of certain members of the group are known to have pharmacodynamic activity.

Alkaloidal studies are also under way on ergot of rye, including investigations designed to clarify mechanisms of biosynthesis and others that may yield clues as to the physiologic role of the alkaloids in the fungus. Similar studies are being started on peyote, now being grown in the University Botanical Gardens from seed.

Expansion of research programs in pharmacy and pharmacognosy in the new building has been accompanied by expansion of the programs in synthetic and analytic pharmaceutical chemistry into quarters formerly occupied by pharmacy and pharmacognosy. Plans call for housing these programs as well as undergraduate teaching in pharmacy in a wing of a building adjacent to the Pharmacy Research Building and now occupied by medicine. Within a few years all teaching and research under the immediate supervision of the staff

of the college of pharmacy will be consolidated in new or completely remodeled quarters. Research in pharmacology will continue to be carried on in the school of medicine, in hospital pharmacy in the University Hospital, and in administration in the school of business administration.

Emphasis on research in pharmaceutical problems involving chemistry and pharmacognosy has characterized the educational program at the University of Michigan College of Pharmacy for nearly a century. Thirty years ago attention was directed also to the rapidly growing field of synthetic pharmaceutical chemistry. Completion of the Pharmacy Research Building has given the college superior physical facilities and equipment for even more vigorous prosecution of research aimed at solution of problems whose answers are basic in pharmacy, pharmaceutical chemistry, and pharmacognosy. Resources in the other areas of pharmaceutical research in related units of the University together with the many facilities available to pharmacy in ancillary departments provide over-all academic resources comparable to the best available in the United States or in foreign pharmaceutical research centers.

**Table I**

**Statistical Data**

Sq. feet, gross: 35,592  
Stories: 4 plus full basement  
Construction: reinforced concrete  
Cost: \$1.25 million  
Sources of funds: NIH grant, \$339,500  
the pharmaceutical industry  
other friends of the College  
the University  
Research laboratory capacity:  
6 staff members  
44 Ph.D. candidates  
master's candidates

**Table II**

**Summary of Facilities**

**First Floor**

lobby and receptionist's office  
receiving room; storage room  
3 product development laboratories  
manufacturing laboratory; control area  
4-room sterile preparations laboratory  
coating room  
compressing room  
granulating room  
shop

**Third Floor**

2 faculty office-laboratories  
2 two-man research laboratories  
5 four-man research laboratories  
instrument room  
reading room  
storage room

**Second Floor**

2-room sterile products research  
laboratory  
3-room radioactive laboratory  
2 faculty office-laboratories  
2 two-man research laboratories  
2 four-man research laboratories  
conference room  
instrument room  
dark room  
oven room  
storage room

**Fourth Floor**

5-room constant environment plant  
growth laboratory  
2-room chromatography laboratory  
2-room low-temperature laboratory  
milling and extraction laboratory  
2 four-man research laboratories  
4-room fermentation laboratory  
2 faculty office-laboratories  
instrument room, herbarium  
conference room



**Fig. 1**  
**University of Michigan Pharmacy Research Building**



**Fig. 2**  
**First and Second Floor Plants, University of Michigan Pharmacy Research Building**



**Fig. 3**  
**Third and Fourth Floor Plans, University of Michigan Pharmacy Research Building**



**Fig. 4**  
**General Office and Reception Area, University of Michigan Pharmacy Research Building**



**Fig. 5**  
**General Manufacturing Laboratory and Granulating, Compressing, and Coating Room, University of Michigan Pharmacy Research Building**



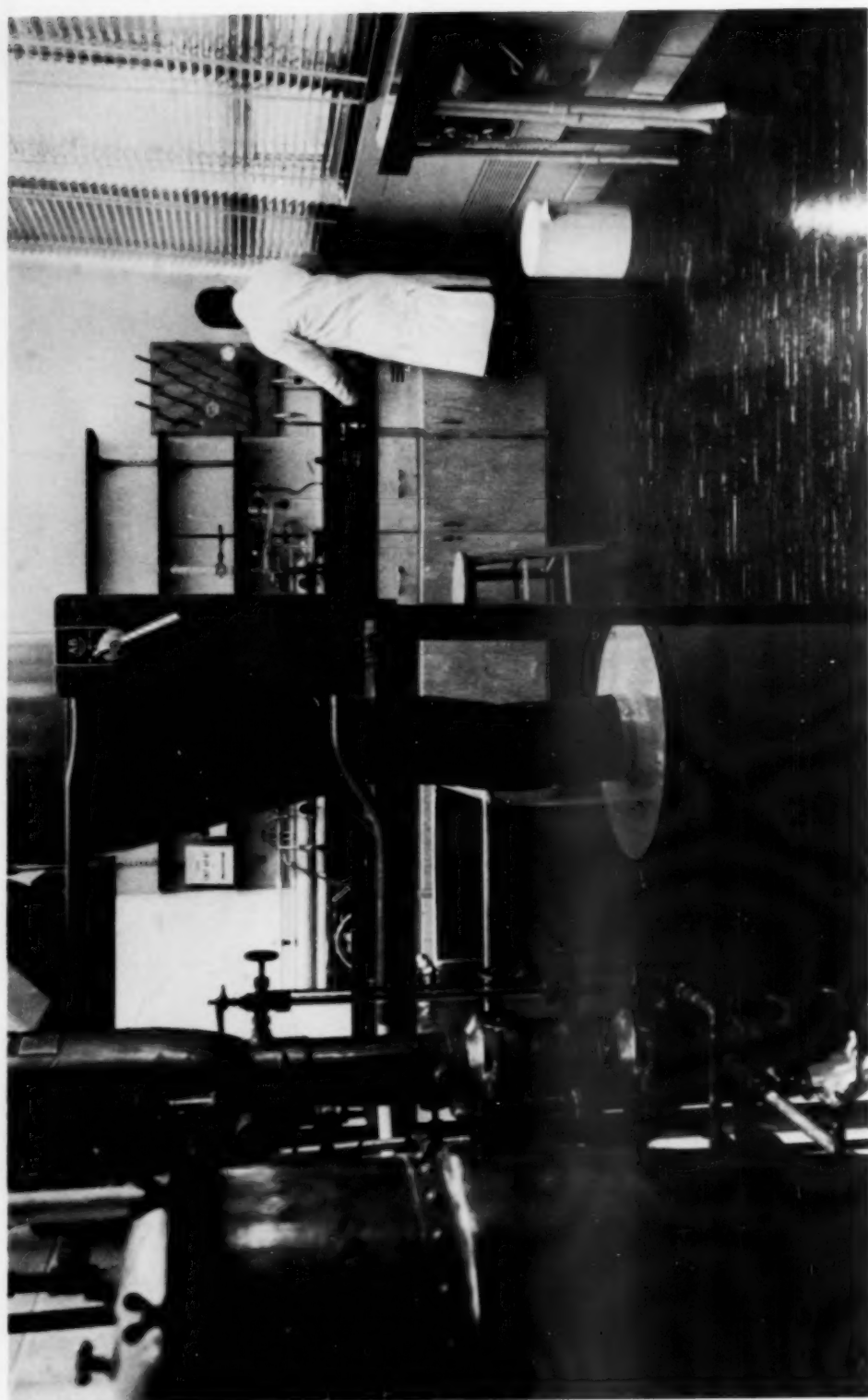
**Fig. 6**  
**Laboratory for Preparation, Packaging and Sterilization of Parenteral Products,**  
**University of Michigan Pharmacy Research Building**



**Fig. 7**  
**Four-man Research Laboratory, University of Michigan Pharmacy Research Building**



**Fig. 8**  
**Milling and Extraction Laboratory, University of Michigan Pharmacy Research**  
**Building**





**Fig. 9**  
**Media Preparation Area of Fermentation Laboratory, University of Michigan**  
**Pharmacy Research Building**



**Fig. 10**  
**Constant Temperature Room of Chromatography Laboratory, University of Michi-**  
**gan Pharmacy Research Building**





## ST. JOHN'S UNIVERSITY COLLEGE OF PHARMACY

St. Albert Hall (Science-Pharmacy Hall) houses the special laboratory facilities for biology, chemistry, pharmacy, and physics on the Jamaica, Long Island Campus of St. John's University.

This building, completed in 1958, was the second of thirteen contemplated buildings on a new 100 acre campus area formerly the site of a golf club. The building, which consists of five and one-half floors, is built into a hill so that only three floors are visible from the campus level. A side view of the building reveals four floors while the rear view reveals all five and one-half floors. The floor designations are as follows: penthouse, third floor, second floor, first floor (campus level), basement and sub-basement. Students coming in on the campus level (first floor) need only walk a maximum of two flights up or down to get to their destination (Figure 1).

The building is 315 feet long by 159 feet deep with two wings, each sixty-five feet wide by ninety-four feet long. A panel on the east side of the building facing the campus level is made of seam-faced granite. With this exception, all exterior walls consist of four inch face brick with eight inch block backing, two inch air space and four inch block furring. Aluminum double hung windows with hopper vents in the

bottom sash are used. The building is of reinforced concrete construction, with reinforced concrete piers, columns, girders, and floor slabs. All interior partitions are four inch thick sand and grit blocks. Laboratory floors are covered with mastipave flooring and corridor floors with asphalt tile. All traffic areas (general offices, corridors, lounges, and dining areas) have acoustical tile ceilings and painted walls. All piping is exposed to facilitate its maintenance.

There are a freight elevator and a passenger elevator located at opposite ends of the building. Distilled water is gravity fed to each laboratory from the penthouse distillation room. The laboratory benches are of blonde oak wood with alberene tops.

Excluding two 115 seat amphitheatre demonstration rooms, provision has been made for future conversion of all lecture rooms into laboratories by tapping utilities already brought into the room. There are a seminar or faculty conference room and a dispensing stock room on each floor.

Construction cost for the building was four million dollars, \$23.30 per

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\*Dean, College of Pharmacy, St. John's University

square foot, not including \$535,000 for fixed equipment. There is a total of 158,110 square feet of useable space.

There are two types of departments in the University, namely, the transverse departments in the humanities, the social sciences, and the physical and biological sciences; and, vertical departments which serve the particular needs of the several professional schools of the University. All of the nonprofessional courses, including the basic science courses in chemistry and biology, are offered by the appropriate transverse department. In these courses, the pharmacy students are integrated with other University science students. The four vertical professional area departments in the college of pharmacy are the department of pharmacy, department of pharmacy administration, department of pharmaceutical chemistry and department of pharmacognosy, pharmacology and allied sciences.

Each one of the transverse science departments has been allocated one floor in the building. Offices of the vertical pharmaceutical department chairmen, offices and research laboratories of departmental faculty members, research laboratories for the pharmaceutical sciences, and professional undergraduate laboratories are located on the appropriately related science floors.

The transverse chemistry department occupies the third floor and maintains the usual basic and advanced chemistry laboratory facilities and lecture rooms. The offices and research laboratories of the members of the department of pharmaceutical chemistry are also on this floor. The quantitative pharmaceutical analysis laboratory (3,000 square feet) (Figure 2) can accommodate fifty-two students and is used on a cooperative basis with the chemistry department offerings in quantitative chemical analysis. In addition to the usual facilities common to an analytical chemistry labora-

tory, this laboratory is equipped with a battery of sixty steam baths and exhaust units along the wall. At both ends of the laboratory, there is a balance room.

The transverse biology department occupies the second floor and also maintains the usual basic and advanced biology laboratories and lecture rooms. Here too, are the offices and research laboratories of members of the department of pharmacognosy, pharmacology and allied sciences. The undergraduate professional courses are offered in laboratories which are shared with related biology department offerings, i.e., pharmacognosy and botany, pharmacology and physiology, applied bacteriology and microbiology. The department also maintains the green house and shares in the use of the animal quarters on the penthouse level.

The pharmacology laboratory (Figure 3) occupies an area of 1,375 square feet and is equipped with four low height laboratory benches each of which will accommodate ten students, five on each side. Double gas cocks and electrical outlet boxes are spaced along the center of each table. The electrical outlets provide both 110 A.C. and variable D.C. voltage. This latter voltage is supplied independently to each table from a central rectifier control panel. A deep sink and water is located at one end of each table. Storage space is provided by cabinets which line two sides of the room. The sliding doors of the cabinets are fitted with slate instead of glass, providing a blackboard for instructional and diagrammatic purposes. The room is also provided with a work bench, an exhaust hood and an upright smoking hood.

Approximately 1,200 square feet are devoted to the animal quarters on the penthouse level. In addition to housing facilities for animals, there are several isolation rooms and an operating room.

The pharmacognosy laboratory (1,800 square feet) contains six low height laboratory benches with ten student working areas, five on each side. Gas, electricity, and water are provided on each bench. Storage cabinets and two work benches are along the walls.

The greenhouse on the penthouse level has an approximate area of 800 square feet and is equipped with an independent heating system, three ceiling vents and blowers each with separate thermostatic controls, an automatic side window vent and a humidifier. A separate connecting room provides additional storage and working area.

The applied bacteriology laboratory (1,415 square feet) will accommodate fifty students. The room is adjacent to a media preparation, sterilization, and glassware washing room, a walk-in incubator and a walk-in refrigerator. Cabinets provide microscope and apparatus storage space.

The vertical departments of pharmacy and pharmacy administration occupy the first floor (Figure 4). Here are located the general pharmacy office, the dean's office, the periodicals reading room, lecture rooms, and several University administrative offices. In addition to the faculty offices and research laboratories (Figure 5), there are laboratories for general pharmacy, dispensing pharmacy, pharmacy administration, manufacturing pharmacy, aerosol research, and graduate pharmacy. These laboratories are used exclusively by pharmacy students in professional courses.

The pharmacy administration laboratory (Figure 6) is completely equipped with retail pharmacy fixtures and is used exclusively for instruction in retail management. Incidental acquaintance with a variety of retail items is also gained. The laboratory was designed with wide aisles behind the counters and

is equipped with audio visual aids including a tape recorder and miniature store fixture scale models. The laboratory occupies 485 square feet exclusive of a storage room and the adjoining office of the chairman of the department of pharmacy administration.

The general pharmacy laboratory (Figure 7) occupies 1,325 square feet and was designed to provide facilities for pharmacy laboratory exercises in principles and processes, preparations, and physical pharmacy. The superstructures on the four laboratory benches, in addition to providing shelving, house the utilities which include gas, alternating current, water, vacuum, and compressed air. Sinks are provided at both ends of each table. Forty students may be accommodated at one time. Each student station contains six individual lockers for a total of 240 student lockers.

The dispensing pharmacy laboratory (Figure 8) occupies 1,340 square feet and accommodates forty students, each with an individual cubical working area provided by a wooden partition table top super-structure. Each working area has shelving, a gas and an electric outlet, and three individual and one community student lockers. Sinks are provided at both ends of each table.

In addition to the laboratory tables, the general and dispensing pharmacy laboratories contain a lecture platform and blackboard, wall typewriter tables, reference book shelves, wall display cases, a wall demonstration table and cabinets, and a refrigerator.

The manufacturing pharmacy laboratory (Figure 9) occupies a total area of 900 square feet. A portion of this area is partitioned into four working area rooms of sixty square feet each. Two of these rooms have installed laboratory benches. Electric outlets of several intensities and other utilities, are

provided in each room as well as along the wall and center bench in the main area. Except for a rotary tablet machine and a forced ventilation drying oven, all manufacturing pharmacy machines are equipped with casters which permit easy movement to a working area. A large floor sink and live steam permits easy washing of utensils and equipment. Storage of small equipment is provided by wall and bench cabinets. Contiguous to the laboratory is a faculty office and control laboratory occupying 260 square feet.

The aerosol research laboratory occupies 260 square feet and is air conditioned. Specially built wall cabinets house the propellant tanks.

The graduate pharmacy laboratory (Figure 10) with an adjoining room occupies 1,025 square feet and will accommodate twelve students, providing each with a desk and an adjoining laboratory table. Cabinets, an equip-

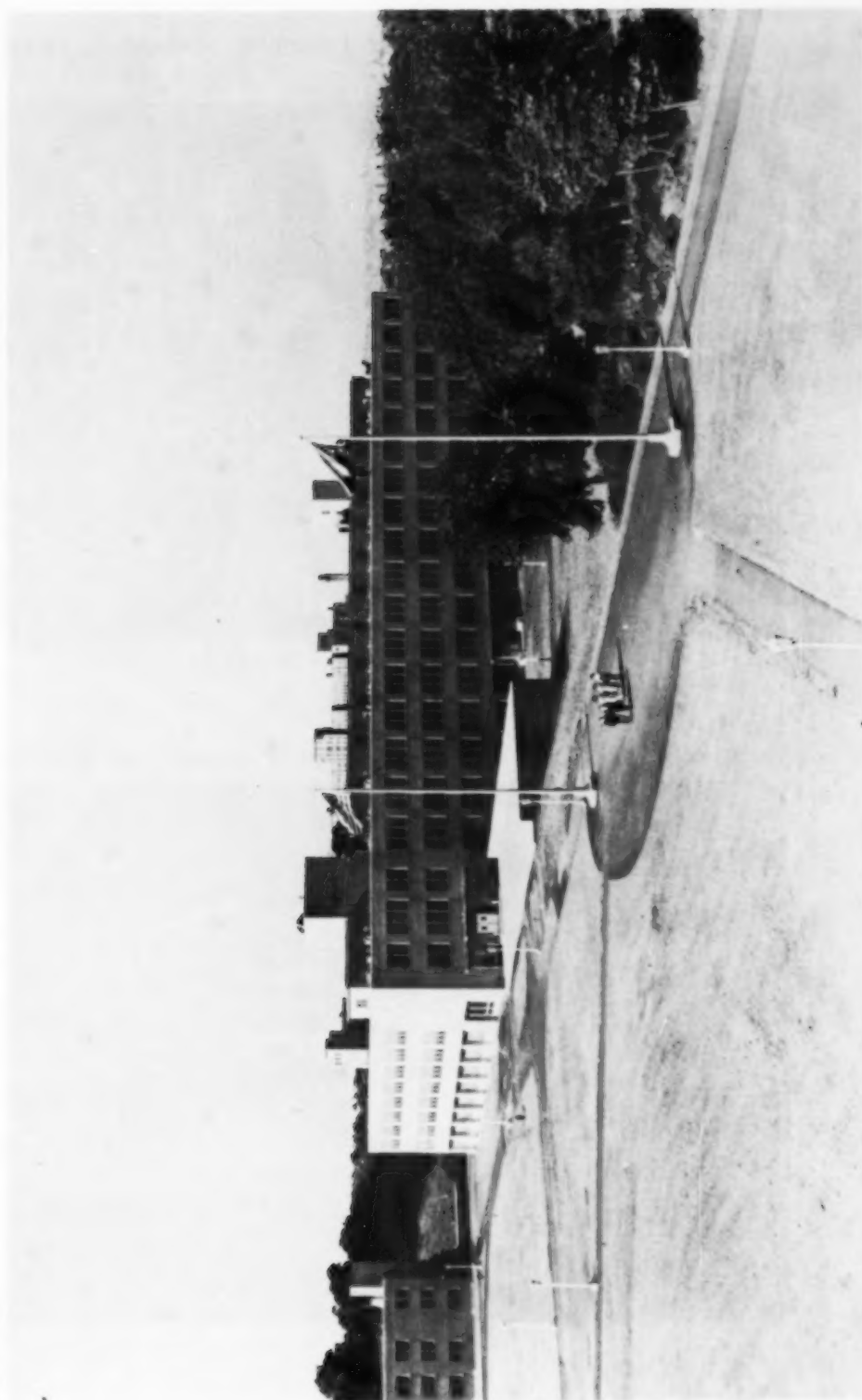
ment table, blackboards and hoods, surround the room.

The transverse physics department personnel and laboratories are located on the basement level along with student lounge and locker rooms, the health counselor's office, and the entrance to the 400 student capacity auditorium which adjoins the building. The roof of the auditorium provides the patio at the campus level entrance to the building.

The sub-basement level houses the cafeteria, machine and carpenter shops, incinerator, receiving room, boiler room, and maintenance and building service quarters. An area on this floor has been set aside for the installation of a special physics research laboratory and a radioactive isotope laboratory.

The facilities available are sufficiently adequate to meet the present and anticipated needs of both students and faculty.

**Fig. 1**  
**St. Albert Hall (Science-Pharmacy Hall), College of Pharmacy, St. John's**  
**University**





**Fig. 2**  
**Quantitative Pharmaceutical Analysis Laboratory, College of Pharmacy, St. John's University**



**Fig. 3**  
**Pharmacology-Physiology Laboratory, College of Pharmacy, St. John's University**





Fig. 4

First Floor (Campus Level) Plan, St. Albert Hall, St. John's University

# ST. ALBERT HALL



**Fig. 5**

**Representative Views of Faculty Offices and Research Laboratories, College of Pharmacy, St. John's University**

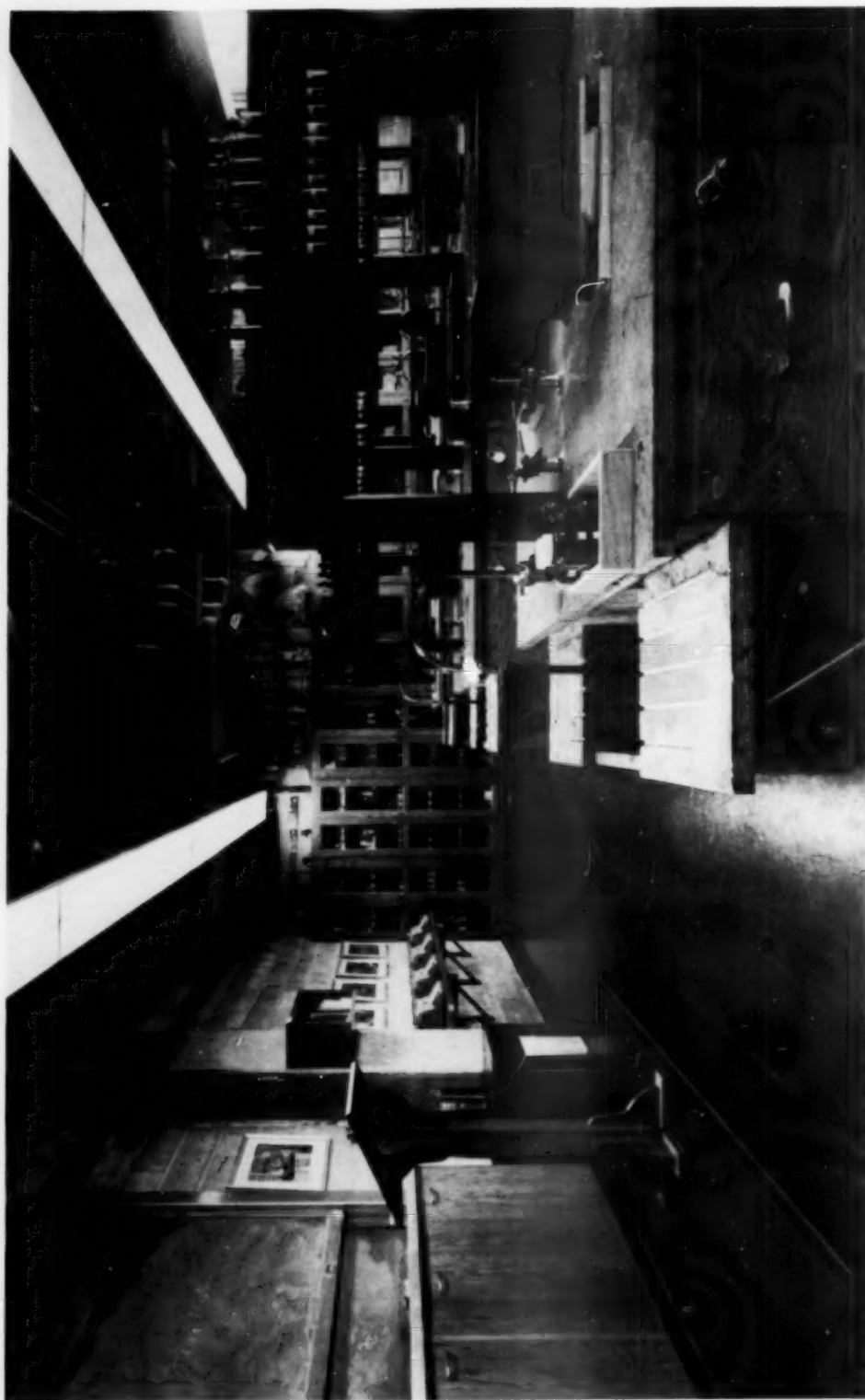


**Fig. 6**

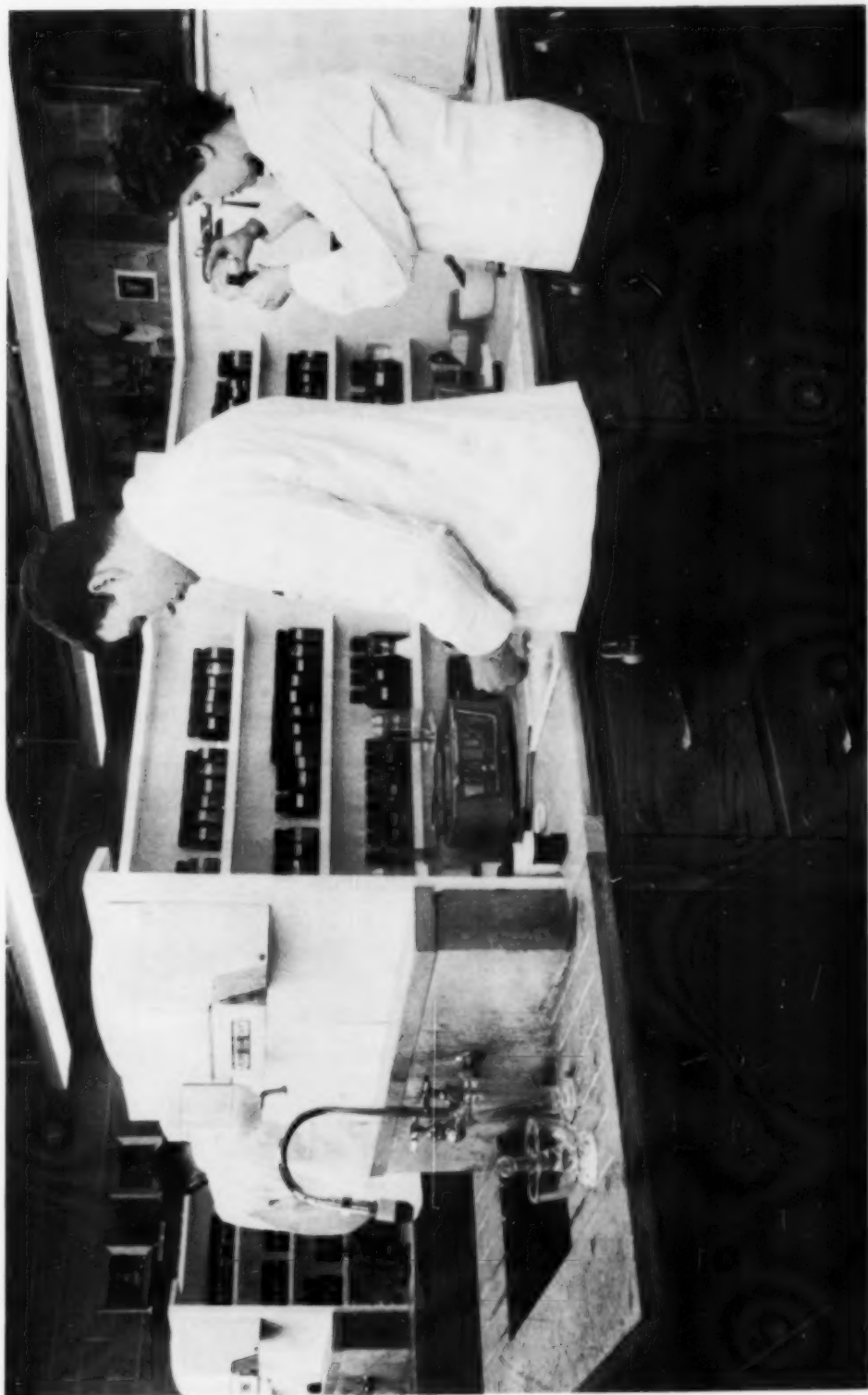
**Pharmacy Administration Laboratory, College of Pharmacy, St. John's University**



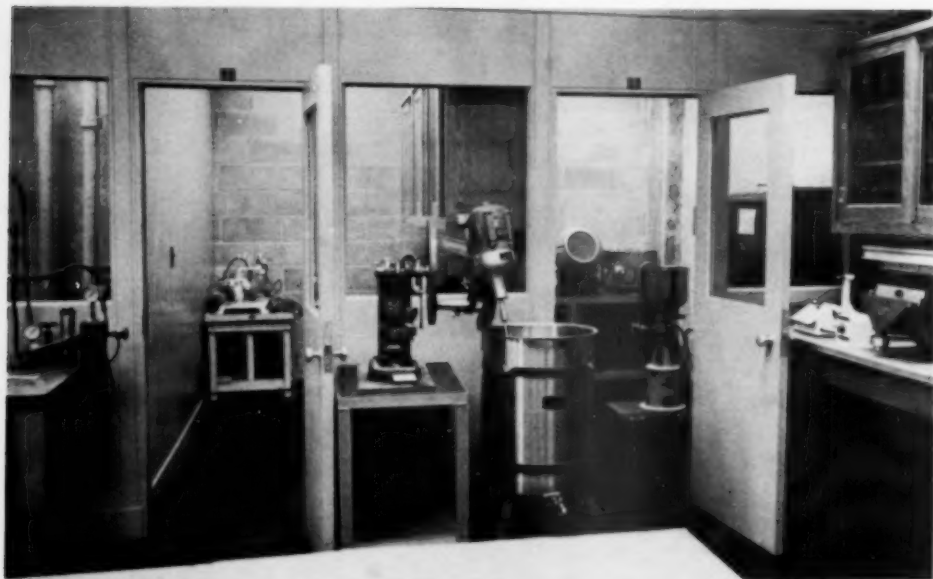
**Fig. 7**  
**General Pharmacy Laboratory, College of Pharmacy, St. John's University**



**Fig. 8**  
**Dispensing Pharmacy Laboratory, College of Pharmacy, St. John's University**



**Fig. 9**  
**Corner View of Manufacturing Pharmacy Laboratory, College of Pharmacy,**  
**St. John's University**



**Fig. 10**  
**Graduate Pharmacy Laboratory, College of Pharmacy, St. John's University**





ERNEST M. ALLEN\*

### THE NEXT DECADE OF SUPPORT FOR MEDICAL RESEARCH\*\*

#### Introduction

I should like to talk to you today about some aspects of the vista ahead for medical and related biological research. I cannot speak with authority about the new discoveries to be anticipated; you are better qualified than I to forecast the developments to be expected in the next decade in the field of antibiotics, or of psychopharmacology, to name two in which rapid strides have been made in the recent past. Nor can I speak of the advances to be expected in restraint of the great killers: heart and vascular disease, cancer, congenital malformations, cirrhosis of the liver, and diabetes (toward further control of the last, your field has recently made another significant contribution). The medical and related biological scientists who are active at the frontiers of our knowledge are best qualified to look across the boundaries and project what could be found there in another decade.

#### The Rising Index of Public Interest

I am, however, able to speak to you about the upsurge of public interest in the work of the investigators in the medical sciences (I shall use this term to cover, as well, *the biological sciences related to medicine*) and about the growing public demand that I have seen, that research activity toward the conquest of the "dread"\*\*\* diseases be accelerated. I shall also relay to you some estimates of the effective force of this public interest a decade hence, and point out some adjustments that will have to be made if it really is to be

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\*Associate Director for Research Grants,  
National Institutes of Health

\*\*Presented to the AACP, Boulder, Colorado, July, 1960

\*\*\*This excellently descriptive term was used in the Resolution of the Senate Appropriations Committee preceding creation of the Jones Committee.

fully effective. As the former chief of the Division of Research Grants of the National Institutes of Health (NIH), the governmental agency through which most of the federal grant support of medical and related biological research is channeled, I have observed from close at hand a simple index of rising public interest. It is the rising Congressional appropriations to the NIH for use in the promotion of medical research. Rising support also from industrial and philanthropic sources is testified to by those who have analyzed data from these sources. Very notable have been the increasing expenditures for research by the pharmaceutical industry.

#### **A Look at the Course of the Rising Index**

Let us take a brief look at this rising index of public interest. The NIH, in its earlier and simpler organization, made a very limited number of grants each year for the promotion of medical research. They fell into two categories, one of grants to pay the costs of research projects and the other, grants for development of more research manpower. They were the beginning of what the NIH calls its "extramural" programs. It was not until 1946, however, that these extramural programs of the NIH began to assume national significance. In that year the Congress increased the NIH's extramural funds by a record-breaking appropriation of \$853,000. Records have been broken by every subsequent Congress, straight through to the present. The appropriation for fiscal 1960, the year just closed, was \$322,550,000. Less than a million, fourteen years ago; 322 million today. Thus has the index of public interest in medical research grown. And proposals in Congress for the fiscal year (1961) which has just begun indicate that the upward climb of the index has by no means come to an end.

#### **The Voice of Leadership**

Members of the two administrations and of Congress alike have had a part in this growth; but it is the Congress, as collectively representative of the American public, that has voiced and indeed given leadership to the insistent public demand that more be done "in our time." Their feeling has been, "Why wait another half century for some great medical breakthrough, when, with intensified research effort, it might occur in the next 10 years?" Those who have looked into the matter mathematically and statistically assure us, indeed, that medical research has repaid more to society in actual dollar returns than it has cost—repaid it, for example, in the continued tax returns of persons who now survive illnesses that would have been fatal in an earlier era. The intensification of medical research in this country has also, of course, brought benefit to peoples abroad as well as to ourselves, raising for both of us our level of health and with it our economic welfare.

#### **Foreign Grants**

I might mention here that the NIH is now making research grants to scientists outside our own borders, when the research proposal shows that the work is necessary and can be done better abroad than here. The logic of this extension is that research is to get answers, and the answer is worth paying for, wherever it can best be obtained.

#### **"Questions Unlimited"**

The past increase in medical research and any that may take place hereafter depend alike on three simple factors: scientific questions that are still unanswered, manpower to attack them, and money to pay the costs. Any one of the three could be a limiting factor. The number of meritorious scientific questions appears to be unlimited, however; or like the limit of outer space it

is beyond the reach of any probing. Furthermore, the total number, whatever it may be, is growing at a rapid rate; for I need not tell you that every scientific question that is answered begets a litter of new questions. There will always be pressing research problems waiting for competent scientists to attack them.

### **Questions Now Under Attack**

Here you may be interested to know something of the vigor of the present national research effort. The national medical research outlay for fiscal 1960 (as contrasted with the previously mentioned portion that is channeled through the NIH extramural program) stands at an estimated total of \$715 million from all sources. If we may now borrow from NIH experience and apply to all other medical research in the country an average figure for the yearly cost (in NIH grants funds) of one "research project," we can divide this average, currently standing at \$18,800, into the entire national outlay (\$715 million) for medical research, and arrive at an estimate of the number of projects now active and correspondingly the number of scientific questions under attack. The division yields a quotient of 38,000 projects.

There is no need to explain to men and women who are associated with medical research in their daily lives that the individual questions in the estimated 38,000 vary immensely in the broadness of their scope. At one extreme may be a quite simple question, requiring no other personnel than the "principal investigator" himself, with the effort finished in a month or two, at a project cost of perhaps less than \$1,000; at the other extreme can be a question calling for a dozen teams of interdisciplinary composition, each working in a different university or clinic, and a question so broad in scope that it gives birth to a succession or a simultaneous burst of

subquestions necessitating many years of work at a project cost beyond half a million a year. In short the estimated 38,000 research projects now in progress in the medical and related biological sciences are like a galaxy containing dwarfs and giants and supernovae, all of varying lengths of life.

I may add that the annual cost per project has been rising, in our experience, partly because of the necessary use of increasingly intricate equipment, but even more because of the increasing need for the "interdisciplinary approach" to the questions that arise today.

### **Recent Research Manpower**

And what can be said of the second factor, research manpower? Research manpower has always been and will continue to be far too limited for the number of important questions pressing for answer; but let me hasten to add that even though limited in relation to questions, research manpower in the overall view has always kept ahead of the still more limited funds with which to meet the costs of research. Our own experience at the NIH bears this out; for when our research grant funds become exhausted each year, projects still remain on the list recommended for grant support (by our advisory groups) that must do without funds.

There are now in this country probably 75,000 medical scientists at all levels of experience, engaged part-time or in some cases full-time in medical and related biological research. They include teachers, research professors, graduate students, students and other educated employees working as laboratory technicians or as assistants or associates on research projects, scientific personnel in research institutes and Public Health and research laboratories (important among the latter being those of the pharmaceutical industry), and M.D.'s who are engaged in clinical or

other research in connection with their hospital practice. If all of the part-time fractions were assembled into wholes, the resulting "full-time equivalent" would amount to about a third (28,000) as many full-time workers.

#### **Recent Manpower Growth**

The present 75,000 level of medical research manpower is the result of a remarkably rapid growth in the past decade or more. Although other sources are available, I shall confine myself to data on manpower growth drawn from *American Men of Science (AMS)*. This publication undertakes only to list those scientists who have acquired some measure of standing in the scientific community. It will probably have 30,000 or more medical and related biological scientists in its 1960-61 edition. Five years ago, in its 1955 edition, there were 17,000, and six years before that, in its 1949 edition, there were 9,000. The rate of increase (amounting to about 12 per cent a year) has, accordingly, been enough to triple the number of *AMS*-listees in a decade. I think we may safely take this as also the rate of recent growth of the whole of medical research manpower. Although at its present mark (the estimated 75,000) it is still ahead of the national supply of funds for medical research, this fact should not be taken to mean that there has been a balanced growth. The distribution of research competencies represented in our present population of scientists could, for example, very well include a larger proportion of M.D.'s with resulting access of research competencies in pathology, surgery, psychiatry, and other clinical fields.

#### **Deterrents to Manpower Growth**

Let me comment here on two deterrents, but for which, I am sure, medical research manpower would have reached its present 75,000 level long ago. I will qualify this statement only

to this extent: if both had been removed, another, lack of research space and equipment, might quickly have raised itself to block further growth.

The first of these two deterrents that acted as brakes upon research manpower growth has been the high cost of preparation for a scientific career. Men of vision, forty years ago, discerned the drag of this retarding force upon the advancement of medical science and pioneered in an effort to do something about it. At that time (in 1922) the National Research Council, with the financial support of the Rockefeller Foundation, initiated its program of NRC Fellowships in the Medical Sciences.\* The program was nation-wide, but of course was of limited extent. The NIH followed their example when it included fellowships in its very modest program of over twenty years ago. Fellowships have continued as an important element in the NIH over-all program for development of scientific manpower. The NIH has, however, made increasing use of an additional concept that has great promise. I refer to the research "training grant," awarded to an institution, not an individual, and providing, in one package: (1) funds to pay stipends to "trainees," who may be working for a Ph.D. degree, or doing other work more or less advanced in nature; (2) funds to cover the costs of the trainees' research or other training experience; and (3) funds to bring in additional faculty, if their specialties are necessary in the contemplated training. The number of trainees at any one institution could be half a dozen or fifty, depending on the capacity of the institution and on what was deemed to be the national need for the training it offered.

These types of grant aid have unfortunately not been too effective in re-

\*The program of NRC Fellowships started in 1919 with the award of thirteen fellowships in the natural sciences.



cruiting men and women into clinical medical research, for the would-be recruit must raise by his own efforts the several thousand dollars of tuition and other costs toward the M.D. degree, and the further undefrayed costs of an internship and residency. The persistence of the deterrent along the M.D. (as contrasted with the Ph.D.) route to a part-time or full-time research career is unquestionably a factor in the underrepresentation of the competencies peculiar to the medical graduate in the population of medical research scientists as it exists today.

### **The Second Deterrent**

This leads to consideration of the second deterrent that has prevented our research manpower in the medical sciences from reaching its present number many years ago. I refer to the limited economic future a college graduate must face if he considers entering a medical scientific career. The medical scientist, if he is a Ph.D., is usually in an academic position in an educational institution. If an M.D., he has this and the alternative possibility of part-time practice and part-time research. The income level in either type of connection, except in academic positions in the very best-endowed institutions, has been unattractively low. In our eighty-five medical schools there are at this time several hundred full-time professorships and other budgeted full-time faculty positions that are vacant and for which there are no takers. I am told that in the seventy-six schools of pharmacy there is a comparable difficulty in diverting highly competent men and women from the path leading to practice into the longer road to an academic and research career.

There are men and women of ascetic nature who have been willing to cast aside all worldly goods and go to live in economically depressed populations as members. Some powerful urge moves

them. There are other men and women, less ascetic perhaps, but of high ability, who have been willing to live their lives as members of one or another of the economically depressed segments of our own population. They too have been moved by a powerful urge, and society has long been in their debt. The urge that has moved those who have gone into careers in medical research is known to you all: it is the joyousness of pure discovery at the frontiers of the science of life itself, combined with the belief that every such discovery, however small, will find its place in the mosaic of knowledge that will place in man's hands at last the array of instruments needed for the restraint or even the conquest of disease. It is fortunate that this idealism has been so largely a counter to the force of the economic deterrent to choice of a career in medical research. But if a continued rapid expansion of research is the will of society for the next decade, with any sort of correction of the underrepresentation of the competencies requisite for clinical research, the economic outlook for careers in medical research will, I am sure, have to be improved. In another type of social organization, the scientist willing to devote his life to search for means to curb the dread diseases, would be loaded with favors — special housing, special income, special educational advantages for his children, special provision for his old age, and the order of the "great leader" would finally be pinned upon him in special ceremonies. Here in this country, although the economic aspects of a research and teaching (but not of a research and practice) career have improved greatly in our larger universities, we are still too dependent on the dedicated idealism of the individual and the associated and inexpensive honor and respect we award him. Somehow, the value to society of medical research, not forgetting

basic research without which the more dramatic final achievements of applied research would dwindle and come to an end, must be made as evident in the market place for man's talents as is the value of the service rendered in other worthy and challenging—and competing—careers.

### **Money, the Third Factor in the Expansion of Medical Research**

This discussion of the two deterrents that have served as a brake upon the past growth of medical research manpower leads back to consideration of the third factor, money, on which the intensified research activity in recent years has depended. The total national outlay, from *all* sources, for medical research (NMR) in the fifteen years from 1946 through 1960, stands at an estimated \$4.0 billion. I do not want to seem facetious or to disparage the need in our busy American life for the tranquilizer I am going to mention, but this amount (\$4 billion) is probably of the same order of magnitude as that spent upon chewing gum in the same period. Without doubt the \$4 billion is also a larger amount than was spent on medical research in all the previous history of the country.

In addition to this \$4 billion the same fifteen years have seen the national expenditure of many millions for the development of medical research manpower. Figures for other granting agencies are not available, but the NIH's contribution in this period has been over \$300 million for fellowships and training grants (and direct traineeships). The other granting agencies, including many foundations, several associations, and not a few industrial organizations, as well as at least three other federal agencies (NSF, OE, AEC), must have made manpower grants totaling another \$300 million if not more. This has been the money.

### **What Lies Ahead?**

And now what lies ahead? Has the momentum of public interest in medical research now spent itself? Or has medical research now grown to its proper stature among the many concerns toward which the nation is willing to devote its collective income? The recent proposals in the Appropriations Committees of the Senate and House seem to give the answer, at any rate for the fiscal year (1961) just begun. But let us take a look at what three distinguished Committees, advisory to high governmental office, have to say. They have given this very question consideration recently in the context of general studies of future needs in medical education and research.

### **One Billion in 1970**

In June, 1958, the Bayne-Jones Committee predicted on the basis of the latest available data that the level of the national medical research effort, from all sources of support, would reach a billion dollars a year by 1970. This would be three times the national outlay for medical research estimated for fiscal 1957, the figure from which they made their projection. But by fiscal 1960, the annual outlay had already risen to three-quarters (\$715 million) of the billion they predicted for 1970. The growth rate for the three years was nearly 13 per cent a year, instead of the 9 per cent the distinguished Committee might have computed from the only data then available to them.

### **Three Billion in 1970**

Just this spring, a second distinguished Committee, the Jones Committee, completed another study. From the vantage point of three additional years of economic information, they were able to advise that the 1970 sights can be raised to three times what was foreseen by the earlier Committee—\$3 billion a year by 1970—and they have so



recommended. The uniform rate of increase to reach three billion would be 15 per cent a year.

### **Strain on the Economy?**

One matter both Committees had, of course, to consider is the strain that it would put upon the national economy to reach the two foreseen levels of annual outlay. The one billion a year would amount to a little over 0.1 per cent of the gross national product (GNP) predicted for 1970; the three billion would require 0.4 per cent. Three billion for one year of medical research can be better comprehended if it is related to some other annual outlays. Here are a few, that, like medical research, are not among the "necessities of life," but that have won an accepted place in our civilization as normal outlays, in no sense excessive for our times:

Recreation, including recreational reading, toys, amusements, \$16.9 billion

Alcoholic beverages, \$10.5 billion

Tobacco products, \$6.1 billion

Personal care (toilet articles, preparations, haircuts, etc.), \$4.2 billion

I do not know if the Jones Committee gave consideration to such figures in arriving at their prediction; but the figures suggest that an outlay of \$3 billion a year for medical research may well be accepted without question, a decade hence, into membership in a group of outlays such as I have quoted. It can be, if public interest continues on its upward course and if conditions exist at that time that make possible the amount of research activity contemplated.

### **\$3 Billion of Research Activity**

But let us look at the meaning of \$3 billion in other terms. Reference has been made to the average "size" of a medical research project, in dollar sup-

port per year. There is reason to expect this average (presently \$18,800) to grow progressively larger with general rise in costs and as more complex and costly projects replace many of the simpler and less expensive research projects of today. As a result the average annual cost per project could reach \$50,000 to \$60,000 by 1970. Three billion divided by these figures gives an estimated 60,000 to 50,000 research projects in operation that year.

### **More Construction and More Manpower**

If 1970 is to see in operation from 50,000 to 60,000 medical research projects of triple the average dollar size of those today, effective effort will have to be made to accelerate greatly the present rate of construction of research and training "facilities" (a term commonly in use for laboratories and their fixed equipment, on up to entire research buildings) and research manpower will have to continue to expand. It may be estimated that a 50 per cent increase, or more, in research facilities (let us think of it as floor space) will be needed, cut possibly, but not substantially, by "more efficient use." Another tripling of research manpower in a decade could also be called for, but here more efficient use may reduce the need. More efficient use of research manpower can be brought about by extending considerably the present practice of including in faculties research professors and other full-time research workers of lesser rank. In general, we may expect, I think, a considerable rise in the proportion of full-time works in the total medical research population. Instead of the tripling in a decade that has gone on in the past, a doubling of medical research manpower may suffice. The "full-time equivalent," referred to earlier, will probably rise to nearly three times its present 28,000 level.

The Bayne-Jones Committee (1958) estimated that twenty new medical schools must be on the drawing boards within the next two or three years, primarily to prevent the ratio of physicians to total population (132 per 100,000) from falling in the next decade, but at the same time to provide the research manpower (both M.D. and Ph.D.) and the research facilities that they foresaw would be needed. The Bane Committee, a third advisory committee, with responsibility to look into future physician supply, also expressed in its report in October, 1959, the necessity for more medical schools. The Jones Committee raised the predicted need for new medical schools to a total of thirty-four. The Committee pointed out the necessity for prompt action toward this new construction.

I should add that the recommendations for more construction as a basis for further expansion of research were not limited to more medical schools; nor was it implied that the necessary growth in research manpower would be solely or even chiefly by addition of more medical graduates, although the need for a larger proportion of M.D.'s in medical research was recognized. It seems likely that the research population engaged in medical and related biological research will continue, at any rate for some time to come, to be predominantly Ph.D.

#### **Where Can We Get the Manpower?**

But suppose the needed construction of new facilities and rehabilitation of old are completed, and on time; will there be difficulty in getting the research manpower to make full use of them? As far as potential supply of talented young men and women to go into research careers is concerned, there should be no worry. Let me give you some figures.

Every year a cohort of some 2,300,000 young men and women reaches

college age. Four out of ten (41.5 per cent) of these have already dropped out, however, before finishing high school and another four (40.6 per cent) drop out before finishing college. Seventeen per cent of the cohort arrive at a Bachelor's or a Master's degree and fewer than 1 per cent reach the top of the educational ladder with a Ph.D (or equivalent), or an M.D. or a dental or veterinary degree. In the more than 99 per cent who do not reach the top, there are 300,000 talented young men and women—300,000 each year—of the same high calibre, intellectually, as the graduate and professional groups from which our medical research manpower is presently drawn. These 300,000 a year—and they should be increased by 5 per cent above present levels simply by growth in population—are the inexhaustible reservoir from which it is possible to draw all the medical research manpower we need. When it can no longer be said that the scientists in medical research are one of the economically depressed segments of the population, then with maintenance of the present freedom of the investigation to work without interference on problems of his choice, there will be no dearth of new recruits.

#### **"Disapprovals"**

Reference has been made to more efficient use of research manpower by adding more full-time research personnel to university faculties. Let me add another thought on more efficient use. Each year one out of every three research grant applications to initiate or continue research is disapproved by our NIH advisory groups. Three thousand applications a year thus become casualties. Back in the institutions from which these 3,000 applications have come, there is not only the wasted effort of unsuccessful planning, but also the research potential in time and space that it was hoped to use which may

now go unused. An analysis has been completed recently in my office detailing the shortcomings in 600 of these disapprovals (1). The results of the study have been made available to your Chairman, and are, I believe, in your hands. (See Table I.) You will find twenty-six line items, each detailing a criticism. It is my belief that these twenty-six items might be made the basis of a check list that the investigator or his department head might use in self-criticism of a research proposal. If the yearly average number of "disapprovals" for each institution can be reduced, the efficiency of use of both research space and manpower in the institution will be raised by a corresponding amount.

Let me now turn specifically to schools of pharmacy and inquire how they may fit into this general picture. It is my understanding that there are active at the present time more than 700 research projects in schools of pharmacy, supported by the various granting agencies. This number should give you great satisfaction. According to a survey prepared in my office this spring, sixty-six of these research projects are being supported by grants from the NIH. Some have had our support for several years.

NIH support of research in schools of pharmacy began, according to our records, in 1951 with three research projects totaling something less than \$20,000. The present sixty-six projects amount to a total of over \$600,000. The increase in numbers in the nine years has been more than twenty times; the increase in money has been more than thirty times. The rate of increase in both in the past four years has been particularly noteworthy: projects have doubled in number each year since 1956, and their dollar amount has more than doubled each year.

I have been interested to observe the

research areas within which your schools are receiving NIH research grant support. In order of decreasing dollar value of support they are:

1. Organic chemical synthesis
2. Pharmacological evaluation
3. Determination and isolation of compounds in natural products
4. Physiological investigations
5. Miscellaneous organic chemical studies
6. Drug metabolism
7. Food technology
8. Therapeutic evaluations

The high position on the list of areas occupied by synthesis and pharmacological evaluation of new compounds reflects not only the present emphasis in the applications you direct to us, but also, I suspect, the companion areas of your research emphasis for years to come. It is gratifying that our Study Sections have seen high merit in your research proposals in these areas. It is also gratifying to see your scientists spreading their interests into other closely related fields, such as those of physiology, drug metabolism, and food technology. Modern scientific education has often been accused of being too severely compartmentalized, but this "crossing over"—of which there are some famous examples in the history of medical research—is testimony to the scientific versatility of the trained scientist. I have in mind, for example, a presently distinguished biophysicist\* who got his Ph.D. years ago in physiology. Perhaps I should caution, however, that NIH Study Sections take a dim view of grant applications that involve a sudden "cross-over" from one field into another, unless the Study Section is convinced that the necessary competence in scientific judgment and skills, including mastery of the literature pertinent to the

\*F. O. Schmitt

problem, is being provided. Speaking of applications reminds me of an interesting detail of information coming out of the recent survey of our grants to schools of pharmacy. I have said that, on the average, one out of every three applications to initiate or continue research received in the NIH meets with disapproval by our advisory groups. In the recent applications from schools of pharmacy the disapprovals are only one out of every four.

I should like to end this discourse with consideration of "where we are going from here, in pharmacy?" The doubling of the number of NIH research grants to schools of pharmacy and the more than doubling of the amount of funds that has been going on for the past four years; the matching grants (\$1,238,300, plus) made by the NIH in the last few years for increasing your equipped research space; the busy activity on the research frontier revealed by your own survey; and the list of

achievements of pharmaceutical research in the past couple of decades are surely grounds for optimism. I shall, however, leave it in your hands to make predictions.

What the reality will be, when it comes, will be no mere impersonal line on a graph; it will be the product of your own hard thinking and planning for further needed increase in equipped research space; the product of your efforts at building up your research faculties, not overlooking the establishment of full-time research professorships if these seem suitable to your needs; and the product of a growing realization among your students that there is great personal satisfaction, if not as yet great financial rewards, in a life devoted to the advancement of knowledge in the field of medicine.

#### **References**

- (1) Allen, Ernest M., *Science*, **132**, 532 (1960).

TABLE I

## Criticisms Raised in Committee Review

605 Grant Applications Recommended for Disapproval, April-May, 1959

Criticism <sup>1</sup>	Applications criticized in this respect	
	Number <sup>2</sup>	Per cent (of 605)
PROBLEM (adversely criticized in 350, or 58 per cent, of the 605 applications)		
Insufficient importance; will produce no new or useful results.....	200	33.1
Not sufficiently related to field of medical or biological science.....	20	4.8
Based on doubtful or unsound hypothesis; based on meager evidence.....	54	8.9
Problem too nebulous or diffuse; does not present clear research aim.....	16	2.6
Overly involved; contains too many elements <sup>3</sup> .....	18	3.0
More complex than investigator realizes.....	49	8.1
Not timely; scientifically premature; only pilot study needed.....	19	3.1
APPROACH (adversely criticized in 440, or 73 per cent, of the 605 applications)		
Approach too nebulous or diffuse; lacks clarity and/or detail.....	174	28.8
Approach lacks scientific imagination.....	45	7.4
Tests, method, or scientific procedure unsuitable.....	210	34.7
Material unsuited to study objectives or difficult to obtain.....	23	3.8
Equipment contemplated is outmoded or crude.....	6	1.0
Over-all design of study has not been carefully thought out.....	89	14.7
Statistical aspects have not been sufficiently considered.....	49	8.1
Controls are not adequately conceived or described.....	41	6.8
Number of observations is unsuitable.....	15	2.5
MAN (adversely criticized in 333, or 55 per cent, of the 605 applications)		
Does not have adequate experience and/or training for <i>this</i> research.....	197	32.6
Unfamiliar with recent pertinent literature and/or methods.....	83	13.7
Needs more liaison with colleagues in collateral fields.....	10	1.7
Will be more productive if he concentrates on fewer projects.....	23	3.8
Proposes to rely on insufficiently experienced associates.....	30	5.0
His previous work in this field does not inspire confidence.....	76	12.6
OTHER (adversely criticized in 95, or 16 per cent, of the 605 applications)		
Unrealistic requirements for equipment and/or personnel.....	61	10.1
Does not have sufficient time to devote to this research.....	18	3.0
Institution setting unsympathetic; local facilities lacking.....	14	2.3
Investigator already has sufficient authority and funds.....	9	1.5

<sup>1</sup> Criticisms pertaining to each grant application in the minutes of the committee.<sup>2</sup> The number of criticisms tabulated per grant application recommended for disapproval ranges from one to seven.<sup>3</sup> Too many problems (single comparisons) lumped together; or too many factors to be tested; or too many response variables to be measured.



## SOME MISSING LINKS IN PHARMACEUTICAL EDUCATION\*\*

It is indeed a pleasure for me to bring you the official greetings of the American Pharmaceutical Association. Your program indicates that you will discuss some of the more serious aspects of your professional responsibilities as educators, and I hope that you find my comments about some of the missing links in pharmaceutical education significant to your deliberations.

Within the family of pharmacy we are concerned, as we well should be, with the current poor public image of our profession. In my comments on this problem, I have attempted to emphasize our assets as well as our liabilities. I have pointed out that among the major characteristics of a profession there are three essential qualifications: (1) an educational system; (2) a system of standards that can be enforced in terms of practice; and (3) a voluntary participation by the members bearing the title of the profession.

At the moment the most valuable asset in pharmacy is its educational system. It is comparable in technical quality to that of the other health profes-

sions, and because of your dedication it is continuously improving. Without this vital asset, there would, indeed, be cause to despair.

Because of my past affiliation with pharmaceutical education, some persons have suggested that I am biased in my praise. Practicing pharmacists in particular display little reluctance to discuss what they consider the shortcomings of your efforts. I hope that you do not find me biased in my criticism as a result of my more recent affiliation.

Unfortunately, the public image of pharmacy today does not reflect the full value of our high educational standards. Our public image is more directly responsive to the actual behavior of individual pharmacists and the gross environment in which they practice their profession. Because of the latter influence, there is a strong possibility that

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\*Secretary and General Manager, American Pharmaceutical Association

\*\*Presented to the AACP, Boulder, Colorado, July, 1960.



our public image will continue to decline in the immediate future.

At the moment most of the negative forces are beyond our control. Although some pharmacists are still not convinced, the mass of evidence indicates that the fall-out of the Kefauver Committee hearings is affecting pharmacy as a profession as much as it is affecting the pharmaceutical industry.

Another negative force is the position taken by the Justice Department of the United States. Our recent efforts to have federal legislation enacted which would provide a modern pharmacy act for the District of Columbia (the current act dates back to 1906) were thwarted with an important assist by the Justice Department which offered an unsolicited opinion during hearings on the bill. Justice, in opposing the mail-order prohibition and other restrictive sections in the bill, in effect said that the providing of pharmaceutical service is not a professional activity.

More recently the Justice Department has taken action against the Arizona Pharmaceutical Association and several of the county pharmaceutical associations in that state. Again, Justice Department action reflects its opinion that pharmacy is a trade dealing in the commodities of commerce rather than a profession dealing in services.

The American Pharmaceutical Association involved itself in the Arizona case at the request of the state association. We have retained qualified anti-trust counsel to assist the state association. The resources of our staff have also been made available because we consider it essential to refute vigorously all charges that would deny pharmacy status as a profession.

We are now living in an era when considerable attention is being given to the welfare of our senior citizens. Nearly every group concerned with

public health in this country is devoting part of its capacity to this subject. Some of the preliminary meetings have produced criticism of pharmacy because the conferees have no concept of how pharmacy functions as a profession or what our objectives are in serving the public health.

At the March, 1960, National Health Forum which was devoted to the subject of aging, several sections discussed the specific subject of drug utilization and drug costs. During these discussions we heard rather broad innuendoes about our profession which we could correct. But our concern is with the many meetings at which pharmacy is not represented.

Activities of unions in sponsoring their own pharmacies or special service facilities for distributing drugs, and the increased emphasis on bringing pharmacists into union ranks are further examples of the external forces detracting from the reputation of pharmacy as a profession.

As we might expect, there are also forces working against pharmacy within the profession. One of the most serious is the disorganized communications system and the attendant lack of communication discipline among organizations as well as individuals. This situation has been allowed to develop over a period of years and reflects the lack of appreciation among pharmacists for what could be accomplished by a united and coordinated profession.

But this factor is only a reflection of our major deficiency—the lack of a real esprit de corps. Basically, whether or not we like to admit it, pharmacy is a profession whose membership consists largely of “free loaders.”

May I suggest that the lack of esprit de corps is one of the missing links in pharmaceutical education.

Between 1945 and 1960, approximately 50,000 pharmacists were graduated upon your recommendation. During this period less than 15 per cent of these graduates were sufficiently motivated as students to accept their individual responsibility to support their national professional society after they became active practitioners. The hard core of the American Pharmaceutical Association today is not the 1945-1960 graduates, but rather the pharmacists who have been members of the Association for years and years. Our profile is that of an aging professional association with inadequate new blood trans-fusing into our life-line.

The A.Ph.A. Pledge Plan makes it possible for graduates to become active members of their national professional society without imposing any economic burden during the first years of practice. Some graduates consider their pledge as their bond. Others renounce their promise at the first opportunity, and a few offer the frivolous excuse that they originally pledged only to keep their dean or faculty advisor happy. Our past experience indicates a 35 to 40 per cent mortality during each of the first four years, and that at the end of the fifth year less than 15 per cent of the original pledge group are still active members.

When it is recalled that only 50 to 60 per cent of the graduating class even make the initial effort to indicate a willingness to become active members, it becomes obvious that there is a significant lack of motivation among graduating pharmacy students.

The attitude of our graduates toward their national professional society is similarly manifested at the state association level. Many of our state societies are supported by less than 30 to 35 per cent of the practicing pharmacists in that particular state.

Because of our lack of esprit de corps we are also a profession which cannot adequately enforce its Code of Ethics. A most effective deterrent and penalty—the denial of membership—is not available to us. Is it not reasonable to expect the professional academic curriculum to yield sufficient residual motivation among graduates to help change the status quo?

Earlier I mentioned the National Health Forum in terms of a problem it presented for pharmacy. I should have also mentioned that pharmacy was represented by two pharmacists—the chairman of the Council and the secretary of the American Pharmaceutical Association. While we were the only pharmacists present among the 600 conferees, physicians and dentists were conspicuous by their presence. Most of these practitioners were representing local health councils or local health activities and their presence was indicative of their interest in public health affairs at the community level. Here again is another possible missing link in pharmaceutical education. The broad aspects of public health are as much a part of the pharmacist's professional responsibility as they are of the physician's or dentist's. By demonstrating a sincere interest in public health affairs the pharmacist can help create the kind of public image to which the profession aspires.

Will a five-year or six-year undergraduate academic curriculum automatically eliminate the missing links I have mentioned? The answer is obviously no. They will not be eliminated until faculties recognize that the objective of pharmaceutical education is something more than building a pharmacist who is a technical expert in dispensing prescriptions and consulting with prescribers. If we are to realize our full potential as a profession, pharmacists must also have a good under-

standing of the social, economic, and political forces that play in the field of public health. Pharmacists must also display an initiative and aptitude in participating in public health affairs as well as organizational activities within pharmacy.

I would be remiss if I did not take note of the tremendous advancement in pharmaceutical education at the graduate level since World War II. Our graduate programs have contributed much to the scientific reputation of pharmacy. But I think there is a possibility that even in our graduate programs there may be a missing link or two.

The Kefauver hearings generally revealed a lack of appreciation by scientists of the importance to preserve a free environment for science in industry and government as well as in academic circles. There were innuendoes that scientists, particularly in pharmacy, can be intimidated. There is the need for articulate spokesmen among the scientists in pharmacy just as there is the need for articulate voices in behalf of the profession *per se*.

Specifically, the missing link to which our graduate program in pharmaceutical education might direct itself is in the area of providing "managers" and "planners." I think of "managers" for the present and "planners" for the future.

In recent years societies within the profession have had to look outside of the profession for personnel to manage our affairs. Pharmaceutical education can play an important role in reversing this trend. We must motivate young pharmacists who demonstrate leadership qualities to prepare themselves for association careers. Perhaps some college will orient its graduate program in pharmacy administration to this area. The American Pharmaceutical Association

will accept its responsibility by providing an internship training program in association management.

While the need for "managers" has always been recognized, we have given little attention to our need for "planners." We must not drift into our future professional role as we drifted into our present position. We must recognize that change is the order of the day and that there is a decided advantage to recognizing changes when they first appear on the horizon. Managing information is becoming an increasingly complex process with a multiplication of knowns and unknowns.

All of you have heard much about the cost of storage of some crops in the government farm program. There is considerable opinion today that we are going to have the same type of storage problem in the future with accumulated electronic data. As important as it is to collect information, it is more important to plan how we are going to utilize it in our society. One expert recently posed the problem by stating that we are entering upon an information revolution in which the supply of data increases by geometric progression. The theory is that as information multiplies, management needs protection from the specialist who has made the information possible in the first place. By the nature of his work a good manager is a generalist. We will need to develop a new profession to provide intelligent service for shaping of strategy and policy. This applies to our society as a whole.

In the not too distant future a new kind of professional school will arise on some campus which will be concerned with developing people who are "planners" who are equipped as generalists, to manage this broad spectrum of information which we are collecting as a society. It is important that this link,

which is a missing link in nearly every area of life today, not become another missing link in pharmacy.

We must prepare now to develop the "planners" for pharmacy who will help us utilize the information we are so busy accumulating. It might help to repair the floundering of the profession during the last few decades if we had such personnel available today.

In summary, the major missing links in pharmaceutical education at the undergraduate level are: (1) the develop-

ment of an esprit de corps sufficiently strong to carry over into professional life; and (2) the development of the whole public health picture among pharmacists before they leave school so that they will be prepared to explore new professional opportunities and to participate in the affairs of public health at every level of society. At the graduate level, there are opportunities to add new links by developing "managers" for the profession itself and by developing "planners" who will guide the destiny of pharmacy in the future.

## THE PRECEPTOR-INTERN RELATIONSHIP

I have been asked to discuss for you the preceptor-intern relationship. In preparing to do this, I talked with several persons—preceptor, intern, professor. From each of these persons I sought ideas, and feelings or attitudes, and aspirations, and facts. I have armed myself with these ideas, attitudes, and facts; not to tell you what it is you do . . . or should do; not to judge what you do; but to know what it is I may bring you of substance and of value.

Piecing together what I have been told, I assume you view the internship as an opportunity to learn and not just as an opportunity for the intern to be employed; as an experience of great professional value to interns rather than as a total economic advantage of great worth to the participating preceptors. I assume that you consider the internship a vital ingredient in the preparation the candidate makes to enter your profession and not as a mechanical hurdle to be properly assaulted or a gauntlet to be penetrated with as few bruises as body will endure or as nimble wits will tolerate. Finally, I must assume you are genuinely desirous of seeing the intern grow in professional independence, in skill and understand-

ing, and in responsible professional behavior, all of which can spring only from healthy helpings of self-direction during his internship.

I should like to go a step beyond those assumptions and state what the internship implies to me. It implies rather substantial responsibility for professional activities in which the interns will be engaging. It implies rather close attention to supervised experiences in the early weeks of internship. It implies remediation to the extent of spotting and correcting incipient professional weaknesses. It implies the chance to get to know a real community through the eyes of the pharmacist. It implies a reasonable coverage of the full range of professional responsibilities, rather than of the lower levels only. Finally, it implies much more than an apprenticeship. The distinction between apprentices and intern is not a small one. The apprentice learns the job on the job, the full burden being on the person

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\*Associate Professor of Education and Director, Cooperative Educational Research and Services, The University of Wisconsin  
Presented at the Pharmacy Preceptor Training Institute, The University of Wisconsin, May, 1960.



under whom he works. The intern learns in school and then learns on the job to apply what has been learned in school; the suggestion is that there is a body of content which can be learned in school and another which can be understood properly only when on the job. Thus, the internship is a much more efficient procedure than the apprenticeship, particularly in the pursuits which are more heavily rooted in knowledge than in motor skills.

I shall discuss for you four matters which seem to me to be important to the preceptor-intern relationship. The first matter I shall call *learning and the intern*, wherein I should like to dispel some myths about learning; to describe a good set of learning symptoms; and, of course, to talk about how what we know about learning may be applied to the internship. The second matter is called *teaching and the preceptor*. Here I should like to describe styles and patterns of teaching which are appropriate or inappropriate. The third matter is the *teaching-learning link*. Complications can, and often do, arise when two elements are combined. Each in its purity may be beautiful to behold; yet when fused they can create a holocaust. The final matter concerns the *stock-taking* which marks any intelligent effort aimed at producing results. This is the judging of value or the effect of what transpires. Like the classic experiment, the results must be capable of being known, and thus recorded, and not assumed or supposed . . . or ignored.

### Learning and the Intern

There is very likely no attic within our entire culture so cluttered with useless—literally useless—notions than the one in which the relics of ideas about learning are stored. Some are harmless, some quizzical, some pernicious. For example, nothing worth knowing (or having) comes easily; or human nature

never really changes; or you cannot teach an old dog new tricks. Because your own notions about learning can help or hinder your work as preceptors, the myths about learning that linger should be respectfully laid to rest.

Perhaps the most persistent such notion is what one writer<sup>1</sup> calls the "hole in the head" theory of learning. It is not a theory and there is not much to the process—organize the facts carefully, present them both logically and repeatedly and repeatedly; tell them what you'll tell them, tell them, tell them what you told them. This process is the basis of rote learning, and it is still highly regarded. As one lad wrote on a test, Francis Scott Key is famous because he knew all the words to the Star Spangled Banner. However, it isn't any trick for you to recognize this process as the well-advertised advertising approach employed so relentlessly by the Madison Avenue mass media technicians. While its effect on buying habits is usually not denied, its effect on buying habits is not that clearly known, and it is completely inadequate to explain learning. I do not recall ever having seen a Hershey Bar advertised. Learning is an emotional and intuitive process as well as a rational and repetitive one.

Another very persistent notion about learning is that it must be unpleasant, like saying the only medicine worth its prescription is the horrible-tasting stuff. You know how this unpleasant idea goes. It does not matter what a person studies, as long as he detests it sufficiently. Conversely, rebellion against this notion has taken the form of a "fun and games" approach to learning which only sugar-coats the same old bitter taste. Human learning is not a withdrawing from pain and an embracing of pleasantness, a notion which does

<sup>1</sup>J. R. Kidd, *How Adults Learn*, p. 21.



not even properly explain animal learning. If there is any trait which distinguishes man most, it is his unflagging sense of purpose, and it will drive him to learn more than will punishment or reward, in spite of pain's piercing stab or the lute-like beck of pleasure.

Another notion of a diehard nature is the one that intelligence is the overriding element in learning. There are some who have it and some who don't . . . and that's the way the ol' ball bounces. Now, if intelligence can be measured, this would seem to make the whole procedure for learning rather simple—find the high I.Q. people, herd them together, and move them along through our educational corridors and the learning problems fade away like old soldiers. But this notion is built, at least in part, on myth. High I.Q. is not essential to high achievement; it certainly is not a guarantee. Persons of average I.Q. have met the most rigorous academic standards—Ph.D.'s in the physical sciences at highly regarded universities. A substantial portion of human existence, of achievement, and of dignity are not comprehended by even the best intellectual standards we presently know. I believe it was Will Rogers who once said, "Nobody is as irritating as someone with less intelligence and more sense than we have."

Then there is this matter of "transfer"; you know, while a student is learning something, he is learning something else, too . . . almost without knowing it. You might call these double learnings educational overtones. The glaring sunlit reality of it all is that an intern is learning to do what he is doing; he learns to dust shelves by dusting shelves, to mix sodas by mixing sodas. He is not learning trade names and prepared drugs by dusting the bottles, nor how to deal with the public by serving sodas. Now, of course, if you decide it is important for the budding pharmacist to

learn these things, then by all means teach them to him. Please do not think he is learning something else by doing them.

On this point, let me express an opinion—the heart of a profession is what should consume the time of an intern. Devoting time to incidental tasks on the assumption that they are part of "reality" is to dilute the profession and stunt the next generation's growth. It is *not* improper for the intern to be impatient with any practices which are undesirable or unprofessional.

A field as old as human learning is bound to have its lingering legends; all that I have tried to do in these few minutes is reduce to myth and place with the other writings of mythology several notions which might get in your way, such as assuming that the more the intern does something the better he learns it; or deliberately making easy things difficult or even unpleasant in order supposedly to enhance their value to the intern; or putting the full burden on the intern to learn—and to change his ways.

Proceeding to the next matter, I should like to talk to you about the symptoms of a good internship. Of the six to be mentioned, five are directly under the control of the preceptor. While each of these characteristics of a good learning situation<sup>2</sup> is somewhat obvious, it is precisely that quality which makes them easy to overlook, and they most commonly are overlooked!

#### **Symptom #1**

The intern knows what he is supposed to learn. It is not that, in some vague way, he has come to understand he is supposed to get some "experience" but rather that he knows in particular,

<sup>2</sup>These six characteristics are adapted from course materials prepared by Dr. Herbert J. Klausmeier, professor of education, The University of Wisconsin.

and desirably in what order or sequence, the specific things (knowledge, skill, or attitude) he is supposed to acquire through the internship. You may know what specifically you want to teach him, but does the intern?

#### **Symptom #2**

The intern wants to learn. This means much more than trial-and-error. Anybody who wants to learn can try and try and try . . . and for that he does not need a preceptor. I believe the key idea here is the systematic or more efficient development of skill, or the mastery of knowledge, or the reconstruction of attitude. As you might expect, problems arise because of the somewhat natural conflict between what the interns want to learn and what preceptors think they should learn.

#### **Symptom #3**

What the intern is asked to learn is neither too easy nor too difficult. To be asked to "learn" something one already knows or can do is too easy. To lack the background to learn what is asked, or even to understand what is asked, is too hard.

#### **Symptom #4**

Whatever materials or equipment are needed are available. Here again is recognition of the fact that we learn better when we can put more than one sense to work at the job. The words for something are less useful than the object itself, and both are better than either; and the benefits progress geometrically as more of the physical senses are put to work. I can still recall the smell of phosgene, although I had only that one fleeting whiff of it in a chemical warfare training lesson many years ago. Yet, I can recall almost none of the many words that were spoken at that time.

The internship, and especially in pharmacy it seems to me, comes close

to achieving the ideal in this respect, because as a rule all the "tools" of the profession are close at hand. That does not seem to be the problem; but their proper use in the reinforcement of learning is. The materials are all available in your establishment, but are they available to the intern? I can imagine that one pharmacist might give an intern the run of the place, educationally speaking, and that another pharmacist might have any number of things on his "mustn't touch" list.

#### **Symptom #5**

The intern realizes which of his efforts or responses are right, which are wrong, and which of them may be either appropriate or inappropriate. Common sense tells us that if someone attempts to learn something, he is entitled to know wherein he has fallen short. While we may think that, on a test, we missed certain items or problems, we may not really have missed at all. This could be a measure of nothing more than our own confidence, rather than of accuracy, but it does not help us in learning to correct our mistakes. Actually, finding out on the examination is too late for efficient learning and, as you know, many students do not even find out then, mainly because professors do not want to go to the trouble to make up another test. One final point about this symptom. It is not enough to know that something is wrong or that something has been done incorrectly. The preceptor must be armed in a better way. The obligation is not on the student to find the better way. The internship is ideal for this type of remedial effort. You certainly cannot ask for a better supervisory ratio—one teacher and one student.

#### **Symptom #6**

The intern is provided with opportunities to use or practice the right or appropriate responses. The value of

learning must lie beyond the test, no matter what its form may be, one way or the other. Some people who tout knowledge for knowledge's sake and learning for learning's sake still want a test included. Now, how much sense does that make? Wilson Mizner wrote: "I have known countless people who were reservoirs of learning, yet never had a thought." I do not see how the internship can escape the full utilitarian impact of this concept; the intern must learn those things that are both important and professionally useful . . . or it is not an internship.

Let me now make a few general comments—comments which relate these symptoms and allied matters to your particular duties as preceptors. I should be inclined at the outset to stress the importance of very limited goals. You cannot teach an intern everything of practical value in one year, particularly if the year is broken up into widely separated segments. If you accept this idea, then some thought must be given to the choices to be made. I would say concentrate on those things of importance in relation to previous and future professional activities, on those things which can be learned more efficiently in this circumstance than in the college classroom. Finally, among your goals, include or make room for the conviction that attitudes can be changed and that interns who are too forceful or terse or not forceful enough can learn to deal firmly and respectfully with people; but they will learn more from what you yourself do than what you trumpet as everlasting precepts.

Another allied matter comes to mind, that of self-learning. Learning systematically all alone is the toughest of all such efforts and the hardest to learn to do. If you have ever tried a correspondence course, you know what I mean. Yet learning more or less alone is more than necessary today—it is

absolutely vital. A British manufacturer said quite recently in a speech that he is unable to employ engineers who have been out of college ten years. This is, in its nature, somewhat more than just keeping up. As preceptors, you have the last and best chance to help the novice pharmacist develop this much-needed faculty of continuing to learn on a planned rather than on an incidental basis, but you will not be able to help unless you are prepared to do so yourself.

Let me introduce another thought in this regard. It has to do with the extent of freedom given a student to learn. There is an embarrassingly large number of seemingly educated persons who today blather about the exercise of authority in teaching. Authority systems are quite necessary in certain fields of human endeavor. They do not help learning except as self-preservation becomes important. Obviously, under such threat, people will learn in order to survive, or they perish. If survival is the only goal, then the threat implicit in authority may not impede learning.

But in what you are attempting to do, this is never true. What you are shooting for is professional growth, and this means changing self, not preserving self. You are interested in seeing wholesome persons who know pharmacy advance in the profession. This is a much broader goal than self preservation. Any form of threat is a barrier to learning when the broader goals are envisaged.

You may be tempted to take pride in an outstanding intern who meets people well, has good work habits, and knows his business. Yet, perhaps that person needs you least and most probably gets the least proportionately from your supervision. The real challenge to the preceptor is in the different types of intern who come to you—the talkative one who knows sixty-eight ways

to say little or nothing; the aggressive one who seems to create a measure of friction every time he moves near people; the intern with faint traces of residual indolence; or any candidate who is less than your idea of the model pharmacist.

Let me see now if I can summarize what I have been saying about learning and the internship. You are in charge, each of you, of a "learning to do by doing" school enrolling one student at a time. This does not make a progressive educator out of you, nor should "learning by doing" be distorted to mean that the interns are learning something by doing anything. That is about as senseless as the exhortations of reactionaries who would have students learning anything by doing something. Aimlessness of either kind is not the route to knowledge and its attendant power.

The mythologies of learning are most inappropriate to an enlightened profession; just as the dramatist might demand that we know the true meaning of, or even the rudimentary facts about, the Oedipus trilogy or the design of the Globe Theater, just as the scientist insists we cast old dogmas aside and arm ourselves with the facts about the universe or about fluoridation, just so can the educational psychologist now implore us to set aside our creaky myths and embrace the results of very creditable research on learning and how that learning takes place. Moreover, people learn what they do, for learning is not a passive process, and they have to want to do what you want them to learn. As the Mock Turtle said to Alice, "No good fish goes anywhere without a porpoise." Adults who are adults will not settle for the gold star bit or the "it will be good for you" routine. And youth or immaturity does not produce better or faster learning, but only easier submission to authority or show of force.

### **Teaching and the Preceptor**

Now let us consider teaching and the preceptor. Each of us creates in his own mind an image of a teacher. We fabricate this image—this model—out of pieces of teachers who have inspired us, influenced us, repressed us, revolted us, but none the less impressed us. When you think of it, children by age eighteen have been in the direct company and under the direct scrutiny of teachers for a total of more than 15,000 hours; time enough to create an image; perhaps more time than the parents see them.

How are the styles in preceptors running this season? What is your particular style? What image of teaching<sup>3</sup> do you use to guide you? Do you visualize teaching as a Socratic discussion, in which a wise and crusty philosopher gets into arguments with naive people, trying to clarify concepts and values rather than to add knowledge? Or do you think of teaching as a town meeting affair, in which people take action to solve problems, and in the process cooperate with each other (I mean truly cooperate and not merely cooperate with the teacher by doing his bidding)? Within the framework of this vignette, the teacher is a moderator rather than an expert. This approach to teaching arises in formal education because of the fact that the injecting of "reality" into the antiseptic atmosphere of the classroom is a problem. Or do you see in your mind's eye an apprenticeship, which is imitative in character, and in which the student identifies himself with the teacher and is made over in the image of the teacher?

The most common image must assuredly be the army or employer-employee model. This scene shows us a person of high status, with power to

<sup>3</sup>Selected from Herbert Thelen, *Dynamics of Groups at Work*, pp. 36-41.



reward or punish, telling others what to do and how to do it and seeing that it gets done. It is not necessarily harsh or unfriendly, as long as the student accepts his position in the scheme of things and bides his time to be the schemer; but subordination and dependency are essential. I must say in all fairness that this model is quite realistic for some types of skill-building, as for example typing or physical work laid out according to a predetermined plan.

The image of teaching is sometimes that of a business deal. A person with money or some other inducement bargains for the services of another. He discusses his plans, oversees progress of the work, and accepts or rejects the results or consequences. You might say this is a contractual arrangement, in which the teacher makes the best deal he can with each student.

These and other images of teaching are prevalent in the minds of adults. Each has a measure of value, and each has a practical place in the teacher's toolkit. Perhaps Mr. Chips was revered because he was all these things wrapped up in one striking package—but he was much more.

Overstreet<sup>4</sup> feels there are four qualities which give any person the capacity to be a teacher. He must himself want to go on learning. In Overstreet's words, "If the teacher has lost his capacity for learning, he is not good enough to be in the company of those who have retained theirs." He must also have some expertness that gives, as it were, a vertebrate character to what he says and does. He must have a sense of relationships broad enough to redeem him from narrow specialization. And finally, he must have a sense of community, a

power to think and act in terms of real problems and resources of real places where real people live. Francis Bacon wrote three centuries ago: "I would address one general admonition to all; that they consider what are the true ends of knowledge, and that they seek it not either for the pleasure of the mind, or for contention, or for superiority to others, or for profit, or fame, or power, or any of these inferior things; but for the benefit and use of life."

Permit me, if you will, to say just a few words about teaching method; educational research supports the principle that learning, both quantitatively and qualitatively, is tied to personal relations. What is learned and how well it is learned hinge upon that subtle alchemy of which I spoke. The burden is on the teacher to make the student feel at home; do not buy any wild, off-balance theories, such as "the way to keep 'em growing is to keep 'em guessing, unsure, and worried." Interns watch you; they note your personal values, your attributes, your general temperament, the things that make you angry, the things that make you laugh. Witty analyzed 12,000 letters written by students about their teachers. They are not impressed with mechanical skills or the method teacher. They are not impressed with spectacular knowledge of a subject. They *are* most impressed with teachers having high ideals, with teachers who are fair in their dealings, and that does not mean unvarying. One youngster told his father the teacher was mean but she was fair. His father said he did not quite understand, and the boy explained that she was mean to everybody. The 12,000 letters added up to a warm, friendly, well-balanced person with high ideals and a strong sense of fairness. Now you must admit the youngsters set the standards pretty high.

<sup>4</sup>Harry Overstreet, *Leaders for Adult Education*, pp. 16 ff.

This entire matter of having a job to do and having to work with other persons to get it done is rather interesting. A number of research projects have been completed for the military on this very point. As I think back on my own military experience, I can recall two types of officer. One was the type of officer who placed mission above all else, including what his men thought of him. If there was a job to do and men to do it, the mission overshadowed all else. The other type of officer was inclined to attach the greatest significance to the morale of his men and to his relationships with them; he wanted to be accepted by them—better yet, to be liked by them. Most officers felt they had to make a choice, to be one or the other, more or less. So one became a buddy to his men, and the other drove his men to the brink of rebellion or desertion. The studies have shown that neither of these two types is a first-class leader. The officers who can keep morale high and still get the job done are the ones the men themselves respect and admire most, and this is not an unrealistic ideal, at all. It is the same with teachers or preceptors. The ones who can do both are most highly regarded: that is, those who can establish a healthy workable relationship with an intern and also get the job done. I am talking about the job of teaching him something, not about the job of running a pharmacy.

A final word or two about methods useful to the preceptor. Older students and young adults dislike intensely domination and unnecessary displays of authority, and subjecting them to this sort of thing on the assumption that those who crack under the strain are not worthy of being pharmacists is sheer idiocy. Worse than idiocy, there is not an iota of research evidence to support it, and I should appreciate it if you will show me how any profession can be

founded upon any other ground than respect for the methods and results of research.

Your knowledge of the intern, your understanding of his motives and his attitudes, and the extent of his emotional control are keys to the success of your efforts as a preceptor. Just two brief facts from educational research to back up that statement. First, as the teacher's knowledge of the student increases, his attitude toward the student improves; the second fact is that the student whose teacher has superior knowledge of him as a student shows greater gains in achievement. The biggest problems of teaching are in the interpersonal realm, rather than in the technical, professional, or mechanical realm.

When you ask an intern to do something different from anything he has done before, the immediate response is surely to be uncertainty and some clumsiness. And if we do not have anything different to ask, why is what we have to offer important? Thus, he needs encouragement—and that is how preceptors are thrust into the interpersonal realm in their efforts to teach.

Consider if you will each of three procedures you might follow: (1) let the intern alone as long as he does not blow up the place; (2) hawk him every minute to make sure he does not; (3) share with him the work and decisions that are related to what he should be learning, employing less direct aggression, insisting on less dependence on you, encouraging more initiative to start new things, making certain that more time is spent in productive work. Almost without qualification, research supports not the first (letting him be), not the second (stalking him), but the third (sharing responsibilities with him).

No matter how old we get and how much younger students look, the intern



is an adult, and few adults learn anywhere nearly as much as they are capable of learning. Moreover, all adults have more, not fewer, emotional associations, with factual materials. Consequently, few teachers of adults—that includes preceptors and professors—teach adults properly. Perhaps this is because, as touched upon earlier, the model we recall is the teacher of children, which model unfortunately also prevails at the undergraduate level in most American universities. The internship certainly should not be in any way patterned after the childhood model or even the classroom model. An adult masters technical knowledge and skill for very practical reasons. He intends to put them to rather immediate use. There are two reasons why a person would want to know a great deal about villanodular synovitis; he is preparing himself as a competent medical authority in this respect, or he has been stricken with it and wants to know what is happening to him and what he can do about it.

Then there is the problem of where to put the blame when things go wrong. Each preceptor who takes an intern commits himself to teach that intern and not to put the burden of his own ineptitude on previous teachers. The elementary school teacher says, "The parents must have let this child run wild"; the high school teacher says, "Didn't the elementary school teach this pupil anything?"; the university professor, high atop his academic perch, looks down and chirps, "Too many high school teachers with too little substance and we reap the harvest of thistles." And perhaps you say, "The first thing we've got to do is jolt these students back to reality and take the air out of all that theory they got in college." The really remarkable teachers that you can remember from your own experience are those who did not have to rely on

all their predecessors to do their job for them. Anyway, most of our suspicions of others, either professional or personal, are aroused by our knowledge of ourselves.

Now, I am not suggesting that the really great teachers devote the bulk of their time to remedying uncomplainingly the mistakes of the past. I am merely saying that the preceptor's task takes these things into consideration. Most of all, the preceptor needs to think through for himself the reason why he wants to help others. Included in this question is the matter of what rewards he wants for himself—money, prestige, professional advancement, emotional support, or simply satisfaction in seeing an important job well done.<sup>5</sup> And remember, if because of your responsibilities as a preceptor you do not get rich quite as rapidly as you had planned—well, there are advantages to being poor; for one thing, doctors cure you faster. The tangible and intangible costs of doing a worthwhile job properly will always be higher than you expected.

### **The Teaching-Learning Link**

I should like to turn now to the relationship itself, to the link that ties together teaching and learning. What are the influences which surround the preceptor? He feels some sense or degree of responsibility to his patrons, to his colleagues, to the state board, to the profession of pharmacy generally, and to the intern. At the time a preceptor becomes one, all these responsibilities except the last have a history. Looking now at the intern, we see that he steps out of a different picture into the internship. He is probably more sensitive to the expectations of his professors, his fellow students, and the preceptor. The preceptor is inclined to overvalue practical experience, whereas the intern

<sup>5</sup> Adapted from Ronald Lippitt, *et al.*, *The Dynamics of Planned Change*, pp. 94-95.

overvalues academic knowledge. Moreover, the intern tends to have a rather strong idealistic drive to right the professional wrongs he sees. On the other hand, the preceptor, particularly, I should think, if he is a retail pharmacist, is part businessman and part professional person, whereas the intern is almost completely taken up with the professional side of pharmacy.

Permit me to introduce three words commonly used in research related to role analysis.<sup>6</sup> *Position* is the description of a location in a system of social relationships. The internship is a position. *Expectation* is an evaluative standard applied to an incumbent of the position. You may, for example, expect the intern to learn to handle in a particular way the prescriptions that are phoned in. Add up all your expectations and you have what the social scientist calls *role*. While the preceptor-intern relationship is a dyadic one, involving just the two persons, the influence of other persons is very much in the picture. Because of these other influences, what the preceptor and the intern each expect of the relationship may be at variance. Each has ideas of his own about what the other should do and about what he himself should do.

These expectations, these viewpoints, may be contrary to what you think they should be, but that is not the point. The point is that they are contrary. I remember hearing about an old man who had lived his entire life within the sheltered confines of Bradshaw Hollow—or Holler, as they say in West Virginia. He decided in his declining years to make the trip to New York City; he had heard so much about it. He came home a week later, and a day or two after that, at dusk, some neighbors had gathered on the porch. One of them

asked him what he thought of New York City, and he replied, "It'll never amount to anything; it's too far away." The focal position in the preceptor-intern relationship should, in my estimation, be the intern, with preceptor, state board officials, and professors occupying the counter or supporting positions. Described as a supporting position, the preceptorship is no less important but not quite as dominant in its role.

All of which means that there are third and fourth parties in the preceptor-intern relationship: the professors who supervise preparation; and the state board which supervises practice. The thing that gives all these persons something in common is the intern and his sequence of experiences which are designed to accomplish whatever you decide the internship is supposed to accomplish. Regarding conflict of interest, hospital superintendents and deans of schools of nursing have a history rich in debate over the proper balance between service to the hospital and educational return to the student nurse. I should think that the intern should either be permitted to assume clearcut responsibilities, that is, be self-propelling, or that considerable energy should be expended in proper supervision. I do not believe there is a third choice that is professionally acceptable.

### Stock-Taking

It would be most remiss of me to speak of all these matters and not have something to say about grades, marks, or evaluation. Teaching success rests upon the ability to measure the difference between what was attempted and what was accomplished. The American Library Association describes four steps in the evaluation of an activity, two of which are taken *before* the activity begins, and two of which are taken *after* the activity is completed. Let me say parenthetically here that I do not view

<sup>6</sup>Neal Gross, et al., *Explorations in Role Analysis*, pp. 48 ff.

the internship as an activity, but rather as a succession of activities, each leading to the other, and all leading to proficiency in the practical use of knowledge and skill. The *first* prior step is to set the objective. What specific outcome is expected? The way in which we make professional intentions honest is by putting them into writing. The *second* is to establish a base line or benchmark. What is true of this situation now? Apropos of this step are four lines from Lewis Carroll:

He had bought a large map  
representing the sea  
Without the least vestige of land  
And the crew were much pleased  
when they found it to be  
A map they could all understand.

The *third* step is to note and record change. In other words, what happened? The results may not always be what you expected. A friend of mine was planning to give his wife a lecture on economy. I saw him shortly thereafter and asked if he got any results. His rather glum reply was, "Yes, I've decided to give up smoking." The *final* step is to consider the recorded changes in the light of circumstances. What do they mean and what should be done about them?

Evaluation, not grades or marks, is quite important to what you do, and perhaps these four steps will help you shape the tools you use for that purpose. I do not view evaluation as judgment in the sense of goodness or badness, a connotation almost sinister in its nature which seems to have crept into learning. A, B, C, D, and F as a system of grading did not originate with the Greeks, and it was not transported here from Europe. It may interest you to know it all began with the American common school, at about the time that Mr. McGuffey introduced the graded

readers to us. Ever since then, but notably in the last several generations, the elementary schools have been trying to tell the high schools and colleges of the country that it was all a terrible mistake.

If you concentrate on the changes in the intern, your questions might take the following tone:<sup>7</sup>

Has his internship with me increased his usable fund of reliable information?

Has he changed his vocabulary (which should consist of more than merely the addition of a few colorful expletives)?

Has he acquired new skills?

Has he learned how to make reliable generalizations?

Has he learned how to sort out the moral ingredients in various situations?

Has he altered any of his attitudes?

There is another angle to this matter of evaluation. What about the preceptor? Is he the right man for the job? Here are four quick self-checks, the like of which you could (and perhaps should) compose from time to time:

Would it take more than a day to teach another pharmacist what I do as a preceptor?

When asked about my work, do I exaggerate its importance?

If I heard preceptors criticized, would I defend them?

Do I talk "shop" when I am with other preceptors?

There is certainly no room for hypersensitivity in this type of self-appraisal. You would not want to be

<sup>7</sup>Eduard Lindeman, *How to Teach Adults*, p. 46.

like the doctor who took offense every time he went past the duck pond.

Let these, then, be my closing remarks. If the internship is to be a learning situation, purposes clearly set forth are needed. Clearly stated and delegated responsibilities for accomplishing these purposes are also needed.

They would include the responsibilities of the different persons involved; the qualifications, other than legal, of preceptors; a description of the relationship of the university to the state board. Clear purposes, clear delegation, and lastly, a means of resolving any difficulties and problems that arise.

## A NEW APPROACH TO DISPENSING PHARMACY

### UNIVERSITY OF TENNESSEE

One of the serious problems facing pharmaceutical education is the constant need for revision of segments of the curriculum. Even though underlying principles remain constant, the application of those principles is changing very rapidly. In the words of a recent visitor in my office, "If we have not changed our methods in the last three years, they are wrong."

The course in dispensing pharmacy is one area in which a new approach seems very desirable. The necessity for revision, ably discussed in a recent article by Autian and Berman in this journal (1), has been brought about by the rapid shift in emphasis from compounding to the use of prefabricated formulations and by the changing nature and increased potency of the drugs themselves. The duties of the retail pharmacist have changed. We cannot serve the profession by allowing our teaching of this important subject to become outmoded.

In an effort to cope with the needs herein discussed, our senior dispensing pharmacy course was completely revised at the beginning of the fall quarter, September, 1959. The revised pro-

cedure has been given a full year's trial, and we believe that other colleges of pharmacy may find our experience of interest.

The new program began with a complete remodeling of laboratory facilities to make available the following essential features:

1. Ample work space for individual students.
2. Ordinary chemicals readily available to all.
3. An adequate stock of trade-named ethical and proprietary merchandise. Approximately 100 large and small pharmaceutical houses have participated in the stocking of the laboratory, which carries a brand-named products inventory of about \$25,000 in retail value.
4. All equipment for complete handling of prescriptions, including telephones, typewriters, numbering machines, filing cabinets, record books, refrigerator, reference library, in addition to standard utilities.

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The work surfaces in the laboratory are covered with simulated marble tile, and all interior areas are finished in attractive pastel colors. A See-All Reflector mirror makes every part of the laboratory visible from any vantage point.

**Dispensing Pharmacy Curriculum:  
Specific Procedures Employed**

Dispensing pharmacy in our curriculum is a twelve-hour course consisting of two lectures and two laboratory periods per week for the three quarters of the senior year.

The laboratory course is made up essentially of 100 prescriptions to be filled each quarter. Assignments are delivered to the student either in written form or by telephone, in increments of five prescriptions. One third of the total number of exercises are called in by means of the special telephone system. Each prescription is telephoned separately to an individual student.

Each group of five exercises includes one or two items which require compounding and three or four trade-named ethical drugs. With the exception that this ratio between compounded and prefabricated products is maintained, the assignments are made without regard for sequence of course material. Ordinarily no two students work on the same assignment simultaneously.

Prescriptions are compounded in a conventional manner and all steps in the dispensing process are included: e.g., mixing, pouring, counting, labeling, numbering, recording, pricing, checking, filing. Only final delivery to the patient is omitted. No medication is actually dispensed for use.

Students are required to make a detailed study of every prescription filled. The study includes theory of the medication and its practical use in addition to information required in compounding or filling. Upon completion the five

preparations are graded and the student is examined orally on each item. The oral examination is given to every student individually by a member of the pharmacy staff, and a numerical grade is recorded for the assignment. The services of one staff member are required for proper supervision of about twelve students.

In following the above procedure we have found it possible to coordinate effectively all of the courses in the pharmacy sequence. Subject matter which has been presented in previous courses can be reviewed in the quiz sessions on specific products. Any prescription for a sulfa drug provides an opportunity for review of sulfonamide therapy in general. Any prescription for an emulsion invites discussion of processes and theories of emulsification studied in previous courses. The student's knowledge of such subjects as pharmacy, physical pharmacy, pharmaceutical chemistry, pharmacology, pharmacognosy can be thoroughly reviewed in the normal course of the dispensing laboratory. Initiative in solving problems as they would occur in dispensing practice is required in almost every exercise. We have found that any area of weakness in individual students or in the class as a whole becomes apparent in the quiz sessions. Pharmaceutical arithmetic may be used as a very good illustration of the principle. Those students who were especially weak in calculations were quickly located; in like manner the types of problems which gave difficulty to the entire class were recognized early in the senior year.

The two lecture periods are used to supplement the laboratory course. Prescription pricing and general compounding procedures are considered at the beginning of the first quarter. Important medicinal products used in prescription practice are introduced into the lecture sessions in a systematic manner, a thera-



peutic classification being used. Dispensing difficulties of significance to the entire class are discussed as they occur. Other pertinent subjects are introduced at the discretion of the instructor.

#### **Rx Writing Program for Medical and Dental Students**

An unique feature of our course is provided through a cooperative program with the college of medicine and the college of dentistry of the University of Tennessee Medical Units. Since September, 1959, the college of medicine has regularly scheduled one week of laboratory work each quarter in the pharmacy laboratory, at the point in the medical curriculum where prescription writing is normally discussed. The medical class, composed of approximately fifty students each quarter, is sectioned in such a manner as to be accommodated by our facilities. Several practice prescriptions are written by each visiting student, and these orders for medication are submitted to the members of the senior pharmacy class for filling in the course of their regular laboratory work, in the presence of the respective medical students. Toward the close of the session medical and pharmacy faculty and students participate in an open discussion of pertinent features of the exercise. Prescription writing techniques are reviewed briefly. Common omissions such as refill instructions, dosage, size, and adequate description of medication are pointed out. Other sources of error or embarrassment in the physician-pharmacist relationship are noted. The joint responsibilities of the members of the health professions are emphasized.

A similar program is conducted with the senior class of the college of dentistry, which consists of approximately thirty-five students each quarter.

The objectives of this cooperative effort by the divisions of the Medical Units are (1) improvement of instruction to pharmacy, medical, and dental students; (2) stimulation of understanding and a spirit of cooperation among the branches of the health professions. The colleges of medicine and dentistry have responded to the plan with interest and enthusiasm. The value of the enterprise to pharmacy students seems obvious. After a full year of trial we feel that the innovation has been successfully introduced into the dispensing pharmacy curriculum.

The new approach to the teaching of dispensing pharmacy has had a marked effect on the morale of the pharmacy student body. The members of the senior class have shown eagerness to give full performance during the three-hour laboratory sessions.

In summary we believe that the following attributes of our revised course in dispensing pharmacy are of value.

1. Ability of the student to use his own initiative in solving problems which arise in prescription practice.
2. Ease of coordination and review of subject matter in a final culminating course.
3. Value of illustrating theory with practical examples of modern medicinal products.
4. Service to the health professions through cooperative effort.

The plan has been given a full year's trial and has been favorably received up to this point.

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FRANCIS L. SCHMEHL\*

## PHARMACY RESEARCH— PAST, PRESENT, AND FUTURE\*\*

I welcome this occasion to meet together and to participate in the dedication of these fine new laboratories for pharmacy research at the University of Michigan. It is particularly pleasant for me to see this completed structure, which represents the culmination of your hopes, your detailed planning, and your foresight in providing for research needs. To me it represents the physical embodiment of one of the essential purposes of government—to encourage the search for basic scientific truths which, when established, may then be used for mutual benefit by all mankind.

I believe that this long overdue expansion of facilities for pharmacy research has an additional significance, aside from its potential value to your current research requirements, in that it represents a formal acknowledgment of the present and proposed role of pharmacy in the broader area of medical research. As you may know, for some years past we have been talking about the necessity for all of the health professions to work together as a team so as to meet the extraordinary demands for training, service, and research which

are present now and which we know will increase in the immediate future. And while pharmacy has long been the handmaiden of medicine, nevertheless it is true that in certain times, both past and present, and in certain situations, the full potential of a truly cooperative effort on the part of medicine and pharmacy has not been realized. Fortunately, that situation usually has been a temporary one and one which I truly believe will be even less observable in the future. Of a certainty, it does not exist on this campus today.

In selecting a topic for presentation today, I was led to consider the question of "Pharmacy Research—Past, Present, and Future" because I believed that it would give me the opportunity to develop further this thesis of the interrelationship of pharmacy and medical science, and to comment on possible values to be found therein. The

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\*\*Presented at the dedication of the Pharmacy Research Building, University of Michigan, December, 1960.

topic chosen is an unusually broad one, and no doubt I shall fail to do justice to it. In making an attempt, however, I propose to devote about equal time to observations on the past and present, and to use those surveys as the base for my remarks on the future.

#### Pharmacy Research Past

When considering the research accomplishments of past investigators in pharmacy, one is at once impressed with the ancient and honorable history of this profession which we honor today. Such a simple preparation as medicinal rhubarb has been known for at least 4,500 years, and it was cited in a Chinese herbal "Pen-King" which has been attributed to the Emperor Chen-nung (*ca.* 4500 B.C.). In a later age it was included in the great work on *materia medica* of Dioscorides (first century A.D.), and only this year a paper has been published in which it is demonstrated that a product equal to the imported one can be grown in one of our western states.

While it is true that we owe much of our historic knowledge of plant and animal medicaments to observations made by earnest practitioners of the art and science of pharmacy in China, India, Babylonia-Assyria, and Egypt, and while it also is true that such information was preserved, as well as elaborated upon, by their successors in Greece, Rome, and the Arabic world, nevertheless I prefer to regard the first stirrings of scientific investigation as being of a much later date. Many of these inquiries of later times stemmed from a burning desire to learn more about the nature and composition of the crude preparations which had been handed down through the centuries and which had served inadequately but sufficiently for the times. As many of these remedies were of plant origin, it has seemed convenient to discuss these earlier as-

pects of pharmacy research in connection with certain plant species.

The use of preparations from the opium poppy for analgesic action can be traced back to the time of Theophrastus in the third century B.C. and later to Paracelsus, who relied extensively on similar crude materials in the sixteenth century A.D. Some 100 years later the English physician Sydenham speaks of these uses as follows: "I cannot forbear mentioning with gratitude the goodness of the Supreme Being, who has supplied afflicted mankind with opiates for their relief; no other remedy being equally powerful to overcome a great number of diseases or to eradicate them effectively . . . Moreover, this medicine is so necessary an instrument in the hands of a skilful person, that the art of physic would be defective and imperfect without it." (1) Nevertheless, it was some 150 years after this, in 1806, before the German apothecary, Friedrich Wilhelm Sertürner, was to isolate the principal alkaloid of opium. He subsequently called this substance morphine, in tribute to the Greek god of dreams, and his work opened the pathway to the isolation of other active alkaloids—codeine in 1832, thebaine in 1835, and papaverine in 1848. All of these discoveries were made by apothecaries—pharmacists—at a time when investigations of alkaloidal materials were being carried out at a very rapid pace.

The studies on analgesic materials by these early pharmacy research workers helped to outline a whole host of chemical and pharmacological problems in which the interest has not abated even to this day. As our knowledge of these substances was increased, the urge to learn their exact chemical structures, as well as the relationship between structure and pharmacological activity, was intensified. After many trials, a gen-

erally accepted formula for morphine was proposed by two English chemists, Gulland and Robinson (2), in 1925, and the desired molecule was synthesized by Gates and Tschudi (3) in 1952.

The many experiments undertaken during the attempts to establish the exact constitution of the morphine alkaloids also served to quicken the desire to explore the relationship of structure to drug action, especially since the natural substances, even when pure, retained the properties of addiction along with those of analgesia. As a result, there were many beneficial by-products of these research studies, such as the introduction of aminopyrine in 1896 by Knorr and Stolz and of aspirin by Dreser in 1899. And in the past score of years newer drug molecules, more closely related in structure to that of the natural materials, have been prepared. Among these are "Meperidine" by Eisleb and Schaumann in 1939, "Methadone" by Böckmuhl and Ehrhart in 1949 and very recently, "Phenazocine"\* which was developed at the National Institutes of Health by Drs. May and Eddy in 1959. Since each of these substances, although representing an improvement over a former drug, nevertheless still falls short of the specifications for an ideal agent, the chemical and pharmacological investigations continue.

Another natural substance, with a history stemming from medieval times and yet an active object of research studies today, is ergot. The earliest recorded account seems to have been in 1582 in the *Kräuterbuch* of Adam Lonicerus, wherein the occurrence of ergot in rye was described. By 1676 ergot was known to be the cause of the disease "St. Anthony's Fire" an illness that "devoured by an invisible fire." Consumption of bread products made

from rye grains contaminated with ergot gave rise to the sickness. Thus the great physiological activity of the substance has been known for many years, and there was limited therapeutic use of crude ergot preparations even in medieval days. Nevertheless, extended use of these crude extracts failed to develop, even in the nineteenth century.

In this instance, effective use of the drug preparation had to wait upon chemical knowledge. It has only been since 1930 that the extremely complex chemistry of the ergot alkaloids has been elaborated, in particular by Jacobs and Craig at the Rockefeller Institute in New York and Arthur Stoll in Switzerland. From these studies it became known that at least six separate bases could be isolated, each one a complex amide of lysergic acid. The research path finally led to the synthesis of that acid in 1956; meanwhile, a very interesting event had taken place. While working with lysergic acid diethylamide in the laboratory in 1947, Hoffman, a co-worker of Stoll, accidentally ingested some of the material and its hallucinogenic effects were revealed to him. This observation has given rise to the present use of that amide (LSD) in psychopharmacology.

What has been the result of these endeavors? On the one hand medical practice, obstetrics in particular, has been provided with greatly improved agents for clinical use. These new drugs are purer, more clearly characterized, and of predictable action. On the other hand, in LSD medical science has been presented with an unique and sensitive tool for use in the study of central nervous system function. It is not difficult to predict that the ultimate value of the latter discovery may exceed that of the former one.

The rauwolfia alkaloids are another case in point. These materials, in the form of crude root preparations from

\*NIH 7519 ( $\pm$ )-2'-Hydroxy-5, 9-dimethyl-2-6, 7-benzomorphan



*Rauwolfia serpentina*, have been used during past centuries in India for a wide spectrum of illnesses ranging from snake bite to insanity. They became known in Europe in 1563 from a book by the Portuguese physician Garcia de Orta, who described many common drugs and medicines of India. The crude botanical was called "insanity root" because of an alleged power to calm deranged persons. Despite this, one is lead to speculate if Shakespeare did not have this substance in mind when Banquo, after the witches séance in *Macbeth*, says, "Were such things here as we do speak about? Or have we eaten on the insane root that takes the reason prisoner?" Although much knowledge of these crude drugs, whose name honors that of a sixteenth century German botanist, was at hand, they were virtually ignored in Europe and America until very recent years. Even with the advent of new tales of the powers of this panacea early in the twentieth century no attention was paid to it. Perhaps the time was not right. Perhaps the tensions of two world wars, as well as that of our modern civilization, were required to prove the need for tranquilizers.

Interest finally was aroused after the isolation of crystalline reserpine from *R serpentina* root in 1952 by Müller (4). His description of the physical and physiological properties of the new alkaloid gave rise to a wave of research investigations, so that in the past eight years there have been at least 1,500 articles on the chemical, pharmacological, and clinical aspects of the *rauwolfia* alkaloids, as well as on the botany of the genus *Rauwolfia*. We now know that there are at least thirty separate well-characterized alkaloids which can be isolated from these roots; three of these have been brought into clinical use.

There is not enough time and this is not the right place to dwell further on

the complexity of these substances; it is sufficient for my purpose to remind you that these simple plant materials, known by mankind for centuries, only recently have yielded significant values as unusual drugs, objects of scientific theory, and structural problems for the fascination of the organic chemist. My prediction is that they will continue to fulfill these purposes for many years to come.

The early research worker in pharmacy not only had an interest in medicinal substances, but he also was instrumental in introducing and advancing the use of new procedures. From the earliest times he used tinctures and extractions. It is interesting to note that, although the process of percolation saw its initial development in France, it soon became less fashionable there and subsequent advances in this art came chiefly from work in America.

The art of ion exchange stemmed from an initial observation by J. Thomas Way (5), an English consulting chemist, who observed that the exchange of ions by the soil furnished an explanation for the retention of water-soluble fertilizers in wet soil, from which one would expect them to be rapidly leached. The technical application of zeolite water softeners followed early in the present century; however, it has been only in recent years that ion exchange materials have been put to use in the isolation and purification of organic compounds. These developments came from work by Adams and Holmes in England on phenolic-type ion exchange resins, which had increased stability and high capacity. These studies then led in two directions—to medicinal uses of resins in such cases as absorption of sodium ion from the intestinal tract and hydrochloric acid from the stomach—and to scientific uses, by pharmacists and others, in the extractions of alkaloids and other materials from dilute

solutions. Once again the needs of clinical medicine and medical research have been served.

Before concluding this look at the past I wish to share one more glimpse with you. This is a view of pharmacy research in the United States of 100 years ago, as mirrored in Volume 30 of the *American Journal of Pharmacy*, which was issued in 1858. The volume contains an interesting original paper by Edward R. Squibb, then at Louisville, Kentucky, on a "New Apparatus for Rectifying Spirits." This proved to be an eighty-gallon still with a charcoal filter system, which could put out three barrels of excellent 180-proof alcohol per day; it also served for the production of absolute alcohol.

Another commentary on the times, past and present, is provided in a paper on the "Use of Gold Coins as a Means of Adjusting Apothecaries Weights." While it is true that these items would provide a fine method of checking balances, the author's claim that such gold coins "are scattered over the whole country and in reach of everyone" is strictly of historical interest. Another article, by Frederick Stearns, related to Michigan. It was headed "The Production of Leeches in Michigan," and it provided an excellent description of the production of the leech and its use in medicine. One can speculate that Stearns was successful in supplying a better product, at lower cost, than the imported variety.

The American Pharmaceutical Association had its seventh annual meeting at the Smithsonian Institution in Washington that year, and a report of the meeting revealed another interesting custom. Every year some thirty or forty new projects would be assigned to willing investigators (presumably members of the Association), each of whom would work on the problem for a year and then would present a report at the

annual meeting. Some proposals were less involved than others; some could be completed in the library or by correspondence, whereas others required actual laboratory work. The system did provide a mechanism whereby an early start could be got on the following year's program.

One of the more interesting questions answered that year was this one: "Does nicotine exist in green tobacco, or is it the result of fermentation during the curing process?" Interestingly enough, in Europe the great Liebig had taken the latter position. In our country, young as it was in scientific investigation, the challenge was taken up by William Proctor, Jr. of the College of Pharmacy in Philadelphia. This scientist, who often has been called the "Father of American Pharmacy," grew tobacco plants, harvested them, and conclusively proved that nicotine did exist in the green leaf. Unfortunately, his analytical methods were not exact enough to enable him to ascertain whether or not the nicotine content was increased during fermentation.

At this same meeting two volunteer papers were given by Frederick Stearns—one on "The Peppermint Plantations of Michigan" and a second one on "The Medicinal Plants of Michigan." Both were published in the *Journal* the following year.

Although much of the *Journal* space was given to recipes for pharmaceutical preparations—ointments, tinctures, and the like—as well as to the publication of abstracts of research work published in Europe, here and there one could find original American work. Such articles included those on formic acid, podophyllin, the process of percolation, *Capsicum annum*, colchicum and colloidion. The content tended to be more applied than basic, but new facts were made known, and new interpretations were given to older concepts.



So much for the past. Admittedly, the sketch I have given you has been both biased and brief; nevertheless, perhaps you will agree with me that it has approximated a cross section of pharmacy research past. The basic studies, for the most part, were founded upon the examination of natural products. The applied ones reflected either simple improvements in the manufacture of tinctures, ointments, and the like or modifications of standard apparatus to fit a special situation. In a great many cases, however, the result was one of value to medical practice, medical instruction, and medical investigation.

#### Pharmacy Research Present

In taking a rather speedy look at the present trends in pharmacy research, I have made use of several techniques. First of all, as the result of my own work during the past four years I have come to know some of our seventy-six pharmacy schools rather well. Secondly, I have spent some time recently in scanning the published scientific papers from many of these institutions. As a result I have been greatly impressed by the fact that pharmacy research, as practiced today, is on the whole a more sophisticated type of endeavor than it was in the past. The individual research worker has more varied interests that did many of his predecessors, and those interests include such fields as medical statistics, tissue culture, submolecular structure, biosynthesis, and the like. He also makes much more use of complex equipment than did his counterpart of only two or three decades ago. Although his research is work-related and motivated towards the solution of problems in the field of pharmacy, nevertheless it frequently is so basic both in its concept and in its execution that it no longer can be characterized as applied research. A few examples may serve to bring meaning to these more general statements.

A paper on a new gum, isolated from the rain lily of Texas (*Cooperia pendunculata*) not only included a description of the isolation procedures and the chemical identification, but also provided evidence on the rheological properties of the new substance. (6) The conclusion was drawn that the product was a natural hydrophobic colloid similar to acacia and tragacanth.

In another instance, a source of ultrasonic energy was used in an attempt to affect the rate of hydrolysis of local anesthetics of the ester type; here the actual objective was an attempt to develop an accelerated stability test for the drug in question. (7)

There has been a whole series of papers, from several institutions, with reference to what may be loosely termed "physical pharmacy studies." These range all the way from a highly theoretical analysis of diffusional movement through heterogeneous barriers through the physics of tablet compression, the kinetics of glucose degradation, and the infrared analysis of pharmaceuticals to the study of aqueous medicinal lubricants. The diffusional investigation, which reflected an attempt to obtain data of use in the formulation of protective ointments, enteric coatings, and similar solvent barriers, was planned and executed at the highest theoretical level. In the tablet compression work I was surprised to see reference to and use of the concept of boundary-type and fluid-type lubrication—technological ideas with which I had had contact in aviation lubricant studies during the recent war. The study on glucose degradation, of course, was an approach to the problem of the prevention of discoloration of parenteral glucose solutions. As for the infrared paper, this is a reflection of the present times in that the modern investigator, be he a chemist or a pharmacist, employs every useful current technique in an effort to

characterize and identify the materials with which he works. The inquiry on medical lubricants even included the design and use of a "lubrimeter" with which the desired properties could be measured.

Another way of looking at the same situation is to consider current investigations in the pharmacy schools from a departmental standpoint. If one examines the current research output of the four traditional departments of pharmacognosy, pharmaceutical chemistry, pharmacology, and pharmacy (some of which have modernized names or extensive subdepartments in our modern schools), the trend towards basic studies and the use of modern instruments, modern techniques, and advanced theory also is quite evident. While it is true that experimental drug plants still are being grown, and harvested, and extracted for their active components, there the similarity to past experience ends. As a matter of fact, even this stage of the work has taken on new aspects, since many plants now are grown in an atmosphere of radioactive carbon dioxide, or are injected with radio compounds, in order that tracer materials may be introduced into the plant by a natural route. And efforts have been made to increase the yield of active substances through the use of various growth chemicals.

In the extraction process many new techniques are used, especially that of the preliminary identification of components through the use of various chromatographic procedures as a guide to a subsequent full-scale separation. After the active principles have been separated, they are purified and identified by the most modern methods.

With respect to pharmaceutical or medicinal chemistry, we find a similar situation. An active search is being conducted for many new types of drugs;

this work encompasses not only the chemical synthesis of new agents, but also the biosynthesis of some compounds and the biosynthetic modification of others, as well as the purification and modification of active materials isolated from plant, animal, and marine sources.

The studies in pharmacology have taken on a variety of forms which seem to reflect the local environment. As an example, in the larger institutions wherein the school of pharmacy is one of a group of schools of the health professions, an intimate relationship generally is to be found among the several units, and all pharmacological studies frequently are to be found within the school of medicine, although joint staffing is practiced. In such cases it often is impossible for anyone outside the school to ascertain the extent to which the research product reflects the interests of the separate schools. On the other hand, many of the smaller schools and several of the larger ones still maintain separate departments with moderate to strong research interests. The studies undertaken in such situations include the classical type of pharmacological investigation on newly isolated principles from natural sources, but in many instances the design of the experiment as well as the subsequent work-up of the data is the use of the most advanced statistical methods, and modern equipment is employed throughout.

In the area of pharmacy, designated as "pharmaceutical technology" by one of your sister schools, considerable attention has been paid to problems involved in the complexing of active agents, the release (especially the sustained and/or delayed release) of active agents from particular dosage forms, the effect of granule size on disintegration time, an evaluation of commercial homogenizers, and similar projects. Hospital pharmacy has not been neg-

lected and increased attention is being given such matters as a reduction in the time required to prepare casein hydrolysates, the glucose coloration problem mentioned earlier, and so forth.

In short, research endeavors in our institutions of pharmacy education are, for the most part, in a state of active ferment, and I strongly believe that this situation forebodes much promise for the future.

Throughout this study of the present I have paid little attention to the current source of support which our modern college pharmacy investigators have for their work. This position has been taken, not because I feel that support is a matter of small concern to the individual, but rather because it is my firm belief that adequate support currently is available for good research programs in the field of pharmacy. As a general proposition, if an individual has proposed a worthwhile problem and has outlined a reasonable approach with which to attack it, funds can and will be found for support of the study.

As evidence for this last statement, I need only to mention the fact that funds for the recent research work mentioned previously have come from a number of sources, including agencies of the federal government such as the National Science Foundation, the Atomic Energy Commission, the Department of Defense, and the Public Health Service; many of the private foundations and the nonprofit organizations in the health field; private industry, and in particular, from elements of the pharmaceutical industry; and university sources.

This brings me, I believe, to the point where I am expected to make some comments on the future of pharmacy research.

#### Pharmacy Research Future

As I view the present, and look toward the future, I am impressed by the need for additional research facilities on the part of many of our schools of pharmacy. We know that a learned profession like pharmacy has three basic responsibilities, namely, education, investigation, and practice. It is necessary that these three be kept in a sound relationship with each other. Unfortunately, as I go about our country I find that many of our schools are lacking in facilities for both teaching and research. While it is true that additional instruction can be given and additional research can be undertaken in temporary or rented quarters, nevertheless we will never have a sound foundation for the profession until each of the supporting schools has been provided with adequate facilities both for teaching and for research. This is the great challenge of the next decade, and all sectors of society will have to share in coping with it.

In the meantime, I am confident that our institutions will continue with their research programs at an ever-expanding rate. In order to handle this responsibility they will have to train more individuals at the graduate level in pharmacy research. Some of this is being done now, but greater efforts are needed. Of one thing, I am certain. There is not now, and there will not be in the future, any scarcity of research problems. As an example, more than one hundred thousand flowering plants remain to be studied for their active principles. A host of poorly characterized alkaloids remains to be carefully rediscovered, identified, and fully characterized. The pharmacological activity of countless unknown principles remains to be uncovered, studied, and put to use for the benefit of mankind.

In summary, therefore, I am leaving you with a thought that is as old as time

—a brilliant future lies ahead for the profession and, through it, for the advancement of mankind. The accomplishment of these cherished goals, however, will require vision, planning, hard work, and a spirit of optimism on the part of each of us.

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## ORIENTATION OF MEDICAL STUDENTS TO PHARMACY

Doubt exists in the minds of many educators and practicing pharmacists that the physician looks to the retail pharmacist for help when problems of a pharmaceutical-medical nature arise. This has been substantiated by Rising's (1) survey conducted to study the role of the pharmacist as a consultant to the medical profession.

The physician has little time to study and evaluate articles in medical journals concerning new drugs. How can we expect him to keep abreast of information on new developments in dosage forms, dosage, product identification, toxicity data, etc.?

Rising's survey indicated that the questions most frequently asked of pharmacists dealt with dosage, strength of active ingredients, therapeutic suitability or contraindications, product identification, price, and forms available. Unfortunately, on the average, each of the pharmacies participating in the survey was asked less than one question a day.

Today we speak of the role of the pharmacist as a consultant to the medi-

cal profession. The results of Rising's survey indicate that the consultant's mantle is seldom worn by the pharmacist. Yet the pharmacist of the future will have had at least five years of academic training. Presumably, he will have had more background in such areas as pharmacology, physiology, biochemistry, bacteriology, and physical pharmacy. Certainly the pharmacist should be well prepared to act as advisor on drugs to physicians, dentists, and the general public. I am not suggesting that the primary function of the pharmacist has changed or will change from that of a compounder and dispenser of drugs to that of a therapeutic advisor and consultant to the medical and dental practitioner. The pharmaceutical curriculum does not train the pharmacy student to assume this role. I envision the role of the pharmacist to be that of an expert on drugs, their dosages, identification, toxicity, sources, and their uses in addition to his role as a compounder and dispenser of drugs.

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The *Lilly Digest* for 1959 indicates that the prescription income from 1950 to 1959 increased 183.5 per cent while other sales increased 41.4 per cent. The number of prescriptions filled has increased from 9,020 per store in 1950 to 14,656 per store in 1959. The figures are certainly indicative of the increasing importance of the prescription department in the retail pharmacy. Furthermore, about 90 per cent of the medications prescribed in this country are specialty items. What sources of information about these specialty items are available to the medical and dental professions? Unfortunately, the chief source of information at the present time appears to be the manufacturer's advertisements. Certainly, the medical and dental professions should not be dependent upon the manufacturer's advertisements for information about specialty items. They should have access to an independent source of information, the pharmacist.

If we agree that the future pharmacist must wear the mantle of advisor and consultant, then the gap which now exists between the education for pharmacy and its use in the practice of pharmacy can be reduced by integrating concepts learned in zoology, physiology, biochemistry, and pharmacology into pharmacy courses like pharmacy technology, pharmaceutical chemistry, manufacturing pharmacy, and dispensing pharmacy. All too often these concepts are ignored in pharmacy courses, leaving the student with no real appreciation and understanding of drug mechanism and drug evaluation.

We cannot prepare our students for their role as advisors and consultants merely by including in our curriculum courses in identifying drug specialties or by having the students memorize the names of specialty preparations. Nor can we achieve our goal merely by adding to our dispensing courses such

material as "how" and "where" to find information on new drug products, although this should be included in the course content. The content of a dispensing course outlined by Autian and Berman (2) should be given careful consideration if we are going to prepare future pharmacists who can function as advisors and consultants to the other health professions. Much can be accomplished by integrating in all pharmacy courses material such as communications and sources of information, techniques in compounding and dispensing, theories of drug activity, and the therapeutic and pharmaceutical aspects of drug evaluation.

If we are to prepare our future pharmacists for their role as drug consultants to the medical profession, then we must also prepare the medical profession to accept the pharmacist in this capacity. Most physicians know very little about pharmaceutical education. It remains for the pharmacist and the pharmacy educator to orient the physician to pharmaceutical education. The practitioner must be impressed with the pharmaceutical skill and drug knowledge required of pharmacists as well as with the scope and nature of pharmaceutical research and manufacturing.

At the State University of Iowa College of Pharmacy we are attempting to accomplish this by orienting the medical students to pharmaceutical education through lectures and visitations to the college of pharmacy of the sophomore and senior medical students. These lectures and visitations are included in the course in prescription writing taught by the college of pharmacy to the sophomore medical students. This course is the ideal place to introduce the medical student to pharmacy and all of its aspects. Two of the nine hours devoted to prescription writing are devoted to pharmaceutical education, the role of the pharmacist as

consultant and physician-pharmacist relationships. A tour of the college of pharmacy laboratories impresses the medical student with the pharmaceutical skill and drug knowledge required of pharmacists. A similar procedure is followed with dental students and dental hygienists.

For the last five years the senior medical students have had a special lecture course to which lecturers are invited by the students. Topics for discussion are chosen by the students and may range from art to religion. Since the inception of the course, the college of pharmacy has been asked to speak on physician-pharmacist relationships and the role of the pharmacist as consultant.

We must make the medical practitioner aware of pharmacy and its importance in the health team. A course in prescription-writing gives one an ideal place to orient the medical student to pharmaceutical education. I believe

that administrators of colleges of pharmacy associated with medical schools can convince the medical schools that a pharmaceutically trained individual is the logical person to teach prescription-writing. Even without a formal course in the medical school or dental school, medical and dental students should be invited as a group to visit the college of pharmacy.

The orientation of medical students should not end with commencement. It is up to the retail pharmacist, at times with the help of the pharmacy educator, to keep the medical practitioner aware of the importance of the pharmacist on the health team without making pharmacy the handmaiden of medicine.

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## AN EVALUATION OF AVAILABLE CASE MATERIAL\*\*

At the Cincinnati Convention a report was presented which attempted to evaluate the case method of teaching as applied to pharmacy administration courses. The report favored the method and carried an Addendum which listed forty-eight casebook references and six reading references from which the teachers might seek out cases related in fact or by implication to pharmaceutical problems in retailing and marketing, jurisprudence and business law. This report was published in the *American Journal of Pharmaceutical Education*, 23, 582, 1959). It also suggested that the Teachers' Conference be a source of solicitation and evaluation for original work being done from year to year. This Committee was continued for the purpose of evaluating and compiling case material for the benefit of all interested teachers.

This year the Committee divided its interest into two channels. One considered the evaluation of cases found in the above-mentioned sources, and the second was given to soliciting and reporting any new material that might be forthcoming. Therefore, the first part of this report offers an evaluation of thirty-three cases compiled by the

Chairman, and the second part offers new cases deemed of value as teaching aids by their authors.

A mailing was sent to a selected sample of fourteen professors believed to be using cases in their teaching. According to replies from Professors Kedersha, Hall, and Hampton, McGregor's *Retail Management Problems* is being used as an excellent resource aid. Professors Kedersha, Hammerness, and Hampton each reported similar copies of a case on the Mead Johnson Company, the original source of which is uncertain. Professors Buatti and Evanson reported original cases used as part of their instruction. Professor Goodness supplied several sets of final examinations, each containing certain brief, problem-type situations, but they could not be evaluated as case material within the scope of this report. Eight professors did not reply.

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\*\*A report of the Committee to Evaluate Teaching Methods, Robert V. Evanson, chairman, Anthony T. Buatti, and Arthur C. Lytle. Presented to the Section of Teachers of Pharmacy Administration, AACP, Boulder, Colorado, 1960.

For matters of clarity and understanding, this report does not include the twelve cases in *Drug Store Operating Costs and Profits*, by O. E. Burley, A. B. Fisher, and R. G. Cox, the numerous *Product Liability Cases* by F. T. Dierson and C. W. Dunn or the twelve cases in the *Casebook in Pharmacy Management* by F. A. Grolle. The Committee assumes that these sources are well-known and are used by the teachers.

### Part I. Published Case Problems

Each of the following cases is available in the text indicated. A definite sequence of reporting is established, as follows: the source is listed and it includes all cases following it; the case title is given along with a brief sentence statement of the nature of the problem; a brief discussion or review of the information presented is given, followed by the nature of the decisions required of the student. Finally, specific courses are suggested wherein the case is used, along with further suggestions as to the specific part(s) of the course(s) wherein it can be used to the best advantage.

Hansen, Harry L., *Marketing Text, Cases, and Readings*, Richard D. Irwin, Homewood, Illinois. 1956.

1. Klein Wholesale Drug Company, pp. 168-172, is an analysis for product policy formulation. Wholesale salesmen report that a competitive product is apparently threatening to replace one or both of their brands of manicure implements in drug stores. Costs, discounts, and history of the products are discussed. A manager of one of the seven branch houses in the chain suggests immediate competitive promotion. The student is asked what the general sales manager should do about the suggestion, the mani-

cure implement line, and also asks for alternative or supplemental suggestions. Use: marketing-competition or sales promotion.

2. Whitehall Pharmacal Company, pp. 426-429, is a consideration of advertising and point-of-sale (p-o-s) promotion. The relationships of 100 salesmen in ten territorial divisions, two phases of p-o-s promotion for retailers and a salesman's bonus proposal are presented for BiSoDol and Koly-nos toothpaste. The student has to appraise the p-o-s promotion and bonus plan and is asked to pose alternative or supplemental questions. Use: marketing-sales promotion, selling techniques, policy formulation; industrial management-personnel management, compensation.
3. Ryan Drug Company, pp. 695-705, presents an analysis of pricing policies. A history of the business is given with operating data for 1946 and 1947. Facts are detailed relevant to the pharmacy's appeal before the Massachusetts Appellate Tax Board issuing from a suspension of the store's license to sell cigarettes because of a violation of an unfair sales practices code in the selling of cigarettes below cost. Both the retailer's and Board's positions are established, and excerpts from the statutes are included. The student must decide for the Board on the violation and offer alternative or supplemental questions. Use: management-price policy, ethics; jurisprudence-ethics, unfair sales acts, resale price maintenance.

Faville, David E., *Selected Case Problems in Retailing*, Prentice-Hall, Inc., Englewood, New Jersey. 1956.

4. Thisby Company, pp. 13-15, de-

scribes a change in structure to accommodate expansion. Thisby, starting with one store, has expanded to a five-store chain. After nine years of success further expansion is anticipated. Structures, business data and facilities are presented, and three new stores are suggested for immediate additions plus a new warehouse. The student is asked to ascertain the advantages and disadvantages of a multiple-unit operation, and whether new organization plans should be adopted. Use: management-store organization.

5. Tri-Corn Company, pp. 59-60, analyzes policies related to purchase discounts. A neighborhood drug store is considering quantity buying in units of thirty-six instead of units of twelve in order to get an extra 5 per cent discount in addition to 2 per cent for cash. Data are provided to analyze the results in each situation. The student is asked to determine minimum quantity discount Tri-Corn can accept to better its return on inventory investment. This is an excellent, short case to prove an important point of basic management knowledge. Use: management-buying and pricing.
6. Peninsula Company, pp. 149-154, details a method of charging window display expenses. Although concerned with a large, departmentized apparel and sporting goods store, this situation can be applied directly to a retail pharmacy. Regular practice is stated as charging these expenses on a monthly pro-rata basis to each department. A change to a direct-use basis is considered. Window layouts, store organization charts, and a one-week display schedule are presented. The student is re-

quired to decide on making the change in policy and practice, to consider and offer any problems which might arise from the change, and to offer a definition of a "good window display." Use: management—accounting and expense control; merchandising—window and interior display.

Boyd, H. W., Clewett, R. M., and Westfall, R., *Cases in Marketing Strategy*, Richard D. Irwin, Homewood, Illinois. 1958.

7. Vebland Company, pp. 135-136, considers the potential strategy for promotion for a cosmetics manufacturer. A thirty-year-old house uses distributors and direct selling by more than 100 salesmen to reach from 60,000 to 75,000 dealers. Salesmen concentrate on large buyers. A proposal is made to 150 salesmen to service smaller accounts but to maintain the sales channels through distributors to keep their cooperation and services. The student is required to decide on this recommended change in strategy. Use: marketing—sales promotion, personnel problems, or detailing and selling techniques. Can also be used with discussion on distribution channels.
8. The William S. Merrell Company, pp. 153-156, proposes adoption of a consumer advertising campaign to promote an over-the-counter ethical drug product. A brief history of the company and some of its products is given to provide background for an analysis of the program set up for Cepacol from 1942 to 1957. Competition advertises to the public, Cepacol to the professional people. Sales data, patent protection, product information, and promotions are presented. The student is asked if



the company should attempt to increase sales by consumer advertising and also to develop the general nature of the advertising campaign. Use: marketing—selling, advertising, or sales promotion; merchandising—professional promotion, drug department promotion.

9. A. J. Albery and Associates, p. 195, involves the dissemination of false advertising by a proprietary drug manufacturer in the advertising of Oxorin Tablets as a blood tonic. FTC contends false advertising in that product has no beneficial effect except in cases of simple iron-deficiency anemia. A brief discussion states these issues in greater detail. The student must decide if changes ordered by the FTC will continue to mislead the public, and if FTC should be given the power to protect the consumer's interest by requiring statements on labels as to what a product will not do. Use: marketing—legislation, government agencies and business, or advertising; jurisprudence—food and drug laws, FTC, and ethics.
10. Elizabeth Arden, Inc., pp. 197-198, considers the legality of supplying demonstrators from a cosmetic house only to certain retailers. Some 287 demonstrators work in 265 outlets which can reciprocate with proper amounts of representative stocks, window and interior displays, fashion show advertising and local media advertising. These stores were mainly department and specialty shops sometimes in direct competition with other non-favored Arden dealers. The student is asked if this policy works a hardship on small dealers, and if it would be necessary or make any difference to them if their sales also increased as a result of demonstrations in the large stores. Use: marketing—legislation, competition, FTC or Robinson-Patman Acts; merchandising—competition, sales promotion, or cosmetic department promotion; jurisprudence—anti-trust laws and practices or ethics.
- Boyd, H. W. and Westfall, R., *Marketing Research, Text and Cases*, Richard D. Irwin, Homewood, Illinois. 1956.
11. The Vaughan Company, pp. 226-227, discusses the potential values of using economic indices. This large manufacturer of chemicals and allied products sold direct primarily as industrial goods was one of the first to set up a market research department. A new, young president requests "briefed-down material" in a straightforward manner for quick digestion related to making decisions on policy and practice. The research director has had no special experience in economic analysis. The student must determine the proper economic indices to use, and he is required to describe each one clearly, including source, frequency of issue and applicability to the company situation. Use: marketing—policy formulation, market research, economics of distribution, production and research.
- McNair, M. P., Gragg, C. I., and Teele, S. T., *Problems in Retailing*, McGraw-Hill Book Company, New York. 1937.
12. J. R. Castleman, Unit Drug Store, pp. 195-197, approaches the problem of cooperative buying. This store, in a town of 7,500 population and nineteen miles from a large city, is considering buying

into a mutual buying association located in the large city. The structure, requirements, deals and terms of the mutual are presented along with a breakdown of store sales by departments. The student must decide on the values of joining the mutual with no delivery and one-week credit extension vs. continuing with the service wholesaler on the usual basis with delivery. Use: management—buying or policy formulation.

McNair, M. P., Burnham, E. A., Hersum, A. C., *Cases in Retail Management*, McGraw-Hill Book Company, New York. 1957.

13. Western Auto Supply Company, pp. 544-564, presents a detailed analysis of an incentive compensation program for retail store managers. Although not a pharmacy chain problem, this case is directly applicable to retail pharmacies, both chain and independent. The completeness of data, considerations of actions, presentation of controllable expenses and profits, operating statements and general information provide excellent learning opportunities for the student, who must consider the incentive plan and the relevant information to decide on its value and workability. Use: management—personnel management, compensation plans, expense control, accounting procedures.
14. Larabee Company, pp. 768-771, develops the preparation of a six-months budget for a small store specializing in children's clothing and accessories. Unrelated to a pharmacy by title, nevertheless this case deals with a most important problem on a simplified basis. A brief store history, sales picture, accounting data, buying terms and merchandise plans are

described and lead to the formulation of cash needs and policy decisions for the period. The student learns the elements to consider, and the teacher can use this as a guide to the development of cases on cash-flow analysis for retail pharmacies. Use: management—financial management or accounting procedures.

McNair, M. P., Brown, M. P., Leighton, D. S. R., and England W. B., *Problems in Marketing*, McGraw-Hill Book Company, New York. 1957.

15. Douglas Drug Company, pp. 374-387, is a problem in the management of personal selling for a medium-size drug manufacturer of some 100 prescription specialty products in 1954, using both wholesale and direct selling channels of distribution. A job description for a professional sales representative is given in fine detail; the difference between specialty and competitive ethical products is described; logs of some trade calls to pharmacists and physicians are given in dialogue. The student should get some feeling for the functions, responsibilities and on-the-spot actions of the MSR. No direct questions are given to lead the reader to any specific line of analysis. Use: marketing—sales promotion, selling and salesmanship; detailing—policies and practices or personnel management.
16. Polaroid Company, pp. 549-555, discusses the pricing considerations of the Polaroid Corporation of Cambridge in the pricing of its then recently designed Polaroid Land camera and Polaroid film. A history of the company, financial data, value of photo equipment and supplies, trade terms, account selections of department,

photography and drug stores, and promotional information are described. The student is led to a price decision without directed questions. Use: marketing and management—pricing and price policies.

17. Chemco, pp. 588-591, is designed to consider the formulation of price policies for three lines of products: staple chemicals sold in bulk as industrial goods, branded specialties sold in bulk to industrial users, and branded drug products sold as consumer goods. The various considerations of markets, quantities, types of goods and buying terms are discussed. The student is led to appreciate pricing difficulties without directed questions. Use: marketing—pricing and price policies.

McGregor, C. H., *Retail Management Problems*, Richard D. Irwin, Homewood, Illinois. 1953.

18. Ralph Nixon, pp. 7-9, was recommended by Professor Hampton. It is a discussion of the problems and considerations in opening a new store. The pharmacist, a chain employee for five years, analyzes his home town of 2,356 as a location potential. An established but run-down business is the only competition to consider, and a storeroom is available. A brief but rather complete description of the location, promotion policies, store hours proposed, compensation, investment needs, and repairs is given along with a proposed first-year budget of financial needs. The student is asked to recommend or reject the proposition and to suggest modifications. Use: management—store location and organization, financial analysis.

McGregor, C. H., *Retail Management Problems*, Richard D. Irwin, Homewood, Illinois. 1957.

19. Woody's Drugstore, pp. 17-18, was recommended by Professor Hall. A brief problem in financial aspects of sales, costs and profits is centered on a declining level of working capital. The student is asked to determine necessary operating ratios, to analyze trends, to determine the significant trends and recommend changes. Use: management—financial management, accounting procedures and management economics.
20. Britton Merchants Association, pp. 21-23, is a project in redefining the trading area of a medium-size metropolitan area. It presents population data, an area map and the formula for Reilly's Law of Retail Gravitation. The student is asked to use all three factors to establish new boundaries, to describe advantages and limitations of such procedures, and to make criticisms. Use: management—store location.
21. Elmhurst Merchants Association, pp. 51-53, is an attempt to organize an all-retail sales training program for 132 stores and thirty-eight service establishments employing 539 salespeople from eighteen to sixty years of age. The nature of the program is considered, and requirements for attendance are described. The student is asked to comment on reasons for the unsatisfactory attendance, to show how each reason could have been anticipated, minimized, or overcome, and to suggest follow-up, post-clinic steps for improvement. Use: management—store organization, personnel management or sales training;

merchandising — salesmanship, training.

22. New Haven Drug Company, pp. 87-89, was recommended by Professor Hall. This is an analysis toward determining a forward buying policy for an independent pharmacy in a city of less than 75,000 population in a large metropolitan area. The location and store are described, followed by some reflections on economic conditions fostered by short supplies during the Korean War which led to forward buying commitments, or overbuying, to the extent of having to lease out-of-store storage facilities. The student is asked about the validity of such commitments, any limitations that might have been established, the reasonableness of certain specific purchases, and the conditions justifying speculative buying. Use: management—buying, stock control, investment return, financial management, management economics.
23. Smithfield Pharmacy, pp. 122-124, was recommended by Professors Hall and Kedersha. A tough problem involves the modification of price policy concerning the granting of a 10 per cent discount on sales to professional personnel attached to the healing arts. The situation progresses from ten to twelve accounts on credit with discount to 130 with the possibility of a new hospital to be added with 600 to 800 employees who might demand both credit and discount privileges. The student is asked if the pharmacy has a "one-price policy" and what modifications should have been made in the store's policy. Use: management—pricing, sales promotion, credit and collections and general policy formulation.
24. Truex Hardware Company, pp. 147-149, expresses a common problem. An old, established, independent business plans an advertising program under new, youthful, third-generation leadership to enhance its competitive position. Material is directly adaptable to a retail pharmacy in a similar situation by merely changing the store name. The owner analyzes his economic position, considers budgets and potential costs on a subjective-objective basis. The student is asked to evaluate the basic premises of the plan, to criticize developmental procedures, and to recommend further steps to develop an effective advertising program. Uses: management — budgets, expense control, advertising and policy formulation; merchandising—advertising and sales promotion.
25. Lynn Merchants Association, pp. 174-178, discusses night store hours. The city of Lynn has 22,000 people and more than 600 retail and service establishments. Disappointing sales increases and night openings in effect in three larger competitive cities prompt consideration of changing local store hours to include evening hours. All elements of pro and con, chain and independent, are presented in a well-organized manner. The student is asked to explain the wide disagreement, to offer an objective method to get the answers, and to describe the action which those in favor should have taken. Use: management—store organization, policy formulation, competition, civic and business cooperation, and store hours.

26. Jackson Drug Company, pp. 203-207, was recommended also by Professor Hall. It is a description of the application of the retail method of inventory. Desiring to control and eliminate stock shortages, the owner consults with an accountant who proposes the retail method and breaks down the steps involved for departmental organization and recording. The fountain and prescription departments are exceptions and are discussed as separate problems. The student is challenged as to the adaptability of the plan, its actual adoption, and alternative or additional recommendations. Use: management—accounting, financial management, inventory control, mark-up-markdown analysis, inventory evaluation.
  27. Quincy Drug Company, pp. 221-223, is a cash flow analysis. It discusses the preparation of a cash-flow budget with certain pertinent data provided. Its purpose is to enlist credit resources for ready cash at a local bank to meet current business debts for merchandise and expenses under certain conditions of stress. The student must decide if the data compiled are sufficient for the statement required by the bank, must prepare the cash budget to be submitted to the bank, and must rationalize on the decision to be made by the bank's credit manager. Use: management—financial management, budgeting, accounting procedures, management economics.
- The above-named text by McGregor has many other brief cases which can be applied to retail pharmacies merely by noting the similarity to pharmacy problems. It would make a suitable case book for the management course
- and also would serve a dual use in a merchandising or sales promotion course. It also can serve as an efficient guide to teachers in the preparation of original case material in a brief, informative manner, but with all necessary facts present to stimulate a proper learning response. It is a small text of only 256 pages, but it contains eighty-six different cases and problems and covers retail operations in all of its various phases.
- McNair, M. P. and Hansen, H. L., *Problems in Marketing*, McGraw-Hill Book Company, New York. 1949.
28. Trabanta Company, pp. 75-76, involves a proprietary manufacturer of a nerve tonic and his consideration of consumer influences on sales promotion methods. About 40 per cent of his dollar volume is spent on advertising through various media. No other promotional method is used. Two officers believe that the development of a sales force would increase volume. Salesmen would be missionary representatives to the trade and professions, and the cost would be a part of the advertising appropriation; thus advertising would be cut back somewhat. The senior officer advises the board of directors to table the suggestion. The student is asked to approve or disapprove as a board member, and the offering of reasons for his decision is implied in the question. Use: marketing—policy formulation, sales promotion or advertising.
  29. Stockton Drug Company, pp. 103-106, is a retail drug chain which considers introducing two new products in its six outlets. Present policy is a concentration of effort on one nationally advertised line of merchandise. The line carried contains similar products, and the



stores also stock several other national brands which would compete with the new toothpaste and hair remedy. An analysis of sales, initial stocks, terms, and general information is given. The student is asked if the store (chain) should purchase and sell either or both of the new products. Use: marketing—sales promotion, merchandising, or product policy; management—product policy, sales promotion, buying, competition.

30. Whitehall Pharmacal Company, pp. 520-526, has been described in this report as Case No. 2 as taken from Hansen's latest work. However, there are similarities and differences of presentation which make a consideration of both cases of value for a more complete analysis.
31. Phillips and Benjamin Company, pp. 546-555, is a dentifrice manufacturer which considers the promotion of a new product for cleaning artificial teeth. The organization history is given with detailed data on expenses, advertising campaigns, selling terms, and advertising costs. Sample advertisements are presented and company officers' opinions are expressed. The student is asked why the company had difficulty in introducing the product, what comments or suggestions he might have on each marketing phase, and what steps should be taken next. Use: marketing—advertising, sales promotion, product differentiation.
32. Dobson Company, pp. 612-614, describes the attempts of a drug and toilet goods manufacturer to expand distribution of a quality toilet preparation through drug chains and finds itself facing the proposition of varying its prices to different buyers. Normal com-

pany practices are explained as to channels and terms. Summaries of proposals made by four drug chains operating sixty stores in a midwest city, twenty-eight stores in an eastern city, one hundred fifty stores in several cities, and seventy-five stores within 250 miles of an eastern city, respectively, are presented for analysis. Top company officers oppose each other with reasons to lead the student in determining which, if any, of these offers should be accepted. Use: marketing—distribution channels, pricing, or sales promotion.

Tosdal, H. R., *Problems in Sales Management*, McGraw-Hill Book Company, New York. 1939.

33. Melvin Rubber Products Company, pp. 215-217, discusses the effects of the growth of retail and wholesale drug chains upon the distribution policies, prices and promotion of a small manufacturer of rubber sundries with one dominating product. The types of chain organizations are briefly described with their effect upon the products in question. The student is asked to determine the action to be taken on distribution policy in general and the dominating product in particular. Use: marketing—distribution channels, product and price policy, or sales promotion.

Time and the lack of availability of many of the forty-eight case reference books permitted the inclusion of only the above problems. Many others exist in the areas of sales promotion, selling and salesmanship available in standard and well-known texts. However, because few pharmacy schools have courses in detailing, salesmanship, merchandising, industrial organization, and management and other similar titles, it was decided to limit the content at this time

to standard course material taught in most of the schools. A continuing of this Committee's work in future years would permit an eventual complete listing of all available case material in review form to provide teachers with a ready reference for material to satisfy their specific needs at any given time. One of the most important uses of these references is to establish a guide in the preparation of original case development by analyzing the various ways in which similar material is organized and described to promote understanding and elicit a proper response.

## **Part II. Original Unpublished Case Contributions**

The following material is submitted to the Conference by the authors indicated with the material to further the interest in and provide additional resource material for instructional purposes only. These cases are not published or commonly available in any reference work. Inclusion in this report does not give publication rights to any person or publishing company except with express permission from the author(s).

1. Mead Johnson & Company. This case was submitted by Professors F. C. Hamnerness (Colorado), R. G. Keder-sha (Rutgers) and R. J. Hampton (Florida). One person stated a possible origination with Professor Begando of the University of Illinois. Further resource material on background and solution can be obtained from an article, "We Built A Food Brokerage Distribution System in 5 Weeks," by D. Mead Johnson and Robert E. Sessions, reported in *Sales Management*, March 15, 1951, pp. 44-48.

In the fall of 1949, it became apparent to executives of Mead Johnson & Co. that in order to maintain their dominant position in the infant cereal field a review of present marketing poli-

cies was necessary. In recent years the company had faced increasing competition from a growing number of pre-cooked infant cereals. As a consequence, doctors—who for years had advised mothers to give their children Pablum or Pabena—gradually started recommending "Pablum or any other good infant cereal." Although sales of both products remained at high levels, competing brands had increased their volume and conceivably could challenge Mead's position.

Mead Johnson & Co. was founded in 1900 as the American Ferment Co. (Jersey City, N.J.) by Edward Mead Johnson, Sr. In 1905, the company changed its name from American Ferment Co. to Mead Johnson & Co. and in 1915 moved to Evansville, Indiana.

In 1932, Mead Johnson & Co. was licensed as the exclusive manufacturer of a vitamin- and mineral-enriched infant cereal developed by scientists of the University of Toronto and the Hospital for Sick Children in Toronto. Mead's own laboratories further researched the product, developed a method of preparing the cereal in pre-cooked, convenient form and, after extensive clinical tests at leading medical centers, placed it on the market as Mead's Cereal, "the world's first pre-cooked vitamin and mineral enriched cereal." Later the name was changed to Pablum. In 1940 Pabena, a pre-cooked and similarly enriched infant oatmeal cereal, was also placed on the market. Both Pablum and Pabena were packaged in a type of cylindrical cardboard container which was commonly used to package oatmeal cereal and which was familiar to most customers.

In 1940, net sales for Mead Johnson & Co. were approximately \$8,000,000. In 1946, they were \$22,000,000. In 1947, net sales topped \$26,000,000. In 1948, they dropped to \$25,456,571,

and it appeared that the year 1949 would end with net sales of only \$23,500,000. Percentagewise, the largest volume of sales came from Mead's Dextri-Maltose; Oleum Percomorphum was second highest; cereals ran third. Mead's infant dietary products were sold throughout the world, and branch offices were maintained in New York, Philadelphia, Los Angeles, Chicago, San Francisco, Dallas, and Boston. Wholly-owned subsidiaries were located in Canada and South America.

Pablum and Pabena had been successfully introduced through the drug trade in keeping with the company's status as a pharmaceutical house strongly identified with many ethical specialties in the nutritional field. Pablum and Pabena, along with the other items of the Mead line, were promoted entirely through the detailing of physicians on a national basis by Mead's sales representatives. Advertising, while limited to the medical profession at large, was both comprehensive and sustained within the field. Through these general policies and with the encouragement and support of the medical profession, Mead Johnson & Co. had early acquired and continuously maintained a position of leadership in the precooked infant cereal market.

By the latter part of 1949, however, food stores accounted for 85 per cent of Pablum and Pabena sales—this notwithstanding the manufacturer's policy of selling only to drug wholesalers. In fact, grocery-store distribution was extensive and superior to that of competition. Pablum was in more than 95 per cent of the high-volume stores and in more than one-half of the small stores. Virtually all chain outlets were handling the product. Additional coverage could, in general, occur only in the smaller stores, many of whose customers could obtain the cereals in other nearby stores.

Virtually all large grocery wholesalers were handling Pablum and Pabena, but many of them had to seek out drug wholesalers in order to replenish stocks. There appeared to be substantial resentment among grocery wholesalers and other direct buyers against having to buy from wholesale druggists at all. Furthermore, there existed no proper machinery for keeping retail-grocery stocks fresh or properly displayed. Competing cereals were finding wider consumer acceptance, and a situation existed in which sales of Pablum and Pabena could decline because of less than routine attention and perhaps quite natural neglect by wholesale and retail grocers. The company felt that its lack of ability to meet competition effectively was severely restricted by lack of direct access to the food stores which were moving the bulk of the Pablum and Pabena poundage and represented the battleground for the infant cereal business. However, it would be with the deepest reluctance and considerable misgiving that the company would decide to deal directly with the grocery trade. The student is asked how he would handle this situation and what he would do to change existing marketing policies.

2. Purchasing a Resort Store Lease.  
Submitted by Professor Bautti of St. John's (New York).

In an isolated resort area near a large metropolitan city there are two drug stores operating. The two stores are owned jointly by three people. Attached to each store is a soda fountain, also owned and operated by the three people. From Memorial Day to the third week in September there are approximately 10,000 residents at the resort. On weekends, because of an influx of visitors, this figure is considerably higher.

Mr. Doer has the *drug concession* at store #1. The sales for the season

approximate \$16,000. The rental is 10 per cent of gross sales. The salaries for Mr. Doer, a janitor, and a sales girl total \$3,200. The gross profit is a little over 35 per cent.

At store #2 the drug concession is operated by a young fellow who is going into the service. Mr. Doer has been given the opportunity to acquire the store. The young man will sell the inventory at wholesale prices (estimated at \$6,000). The rental at store #2 is also 10 per cent of gross sales. The gross sales are \$18,000. The salaries amount to \$3,900. The distance between the stores is approximately one-half mile. There is no competition to speak of because the nearest store is more than a one-half hour drive by car. There is no transportation into the resort other than by car. Between the two stores there is now a daily exchange of merchandise.

The three owners of the concessions feel that since it is a going business they should be compensated in the form of

good will. The lease would run for four years in both stores. Question: What would you pay as a fair price for the drug concession? Is it a good, profitable proposition? Explain. Would you pay for good will? Explain. How much would your good will offer be if you were asked to volunteer an estimated sum? Would you consider a long-range investment; that is, the possibility of acquiring a second five-year lease?

3. The Stanry Company—a proprietary manufacturer—marketing program. Submitted by Professor Buatti of St. John's (New York).

In 1939, the Stanry Company was formed. Its formulation evolved from the scientific, technological advances in the field of chlorophyll therapy. In 1938, clinical data successfully proved the effectiveness of chlorophyll and its derivatives as healing and deodorizing agents. In this conjunction the Stanry Company brought out the following listed products on the market:

**Chloresium Ointment    List Price**

1 oz. tube .....\$1.35  
4 oz. tube.....\$3.60

**Chloresium Solution Plain**

2 oz. bottle.....\$1.15  
8 oz. bottle.....\$3.00

**Chloresium Mucinoid (Powder)**

25 powders .....\$2.00  
50 tablets.....\$2.00  
200 tablets.....\$6.00

**Chloresium Toothpaste ....\$0.75**

**Chloresium Tablets    Selling Price**

30 tablets.....\$1.25  
100 tablets.....\$3.00  
1000 tablets (\$17.50).. —

**Chloresium Nasal Solution**

½ oz. d.s. bottle.....\$1.25  
2 oz. d.s. bottle.....\$2.25  
8 oz. d.s. bottle.....\$5.25

**Chloresium Aerosol Solution**

½ oz. d.s. bottle.....\$1.25

In distributing the products to retailers two methods were employed:

A. *Direct.* On a contract basis, the retailer signed a contract in which he agreed to purchase a minimum of \$50.00 (net) worth of Stanry products during the year contract is in force.

The contract is renewed automatically if the retailer makes minimum purchases. He buys at wholesale prices under this contract.

B. *Indirect.* The retailer may purchase Stanry merchandise from the wholesaler or jobber, but by doing so



must pay the "List Price" rather than the wholesale price.

As to discounts, the Stanry Catalog prices all merchandise at "List." From this list price the wholesaler and the retailer holding a contract receive a discount of 15 per cent. This list price is also the suggested price for turnover items to physicians, which allows the contract retailer a 15 per cent turnover mark-up. Special prices on quantity purchases of some items are extended.

The terms allowed were sixty days net and 2 per cent if paid by the fifteenth of the month following. Most Stanry products which could be legally sold over the counter were fair-traded. The minimum resale price was carried on all state fair-trade price lists. This price was determined by a mark-up of  $33\frac{1}{3}$  per cent from the net price paid by a contract retailer.

As an ethical drug manufacturer Stanry restricted the sale of merchandise to (1) stores having a drug store license and employing registered pharmacists (licensed drug stores and some department stores meeting these requirements), (2) licensed physicians, (3) hospitals, (4) industrial firms having a physician in charge of their first-aid or industrial health departments, and (5) wholesalers supplying the drug trade. Every effort was made to confine the products to these channels.

Fourteen branch offices are maintained. These branch offices serve as shipping depots for the area they serve and as headquarters for the sales force covering the area. They are only depots, as all manufacturing is centered at Mount Vernon, New York. Each branch has an office manager to supervise shipping, billing, etc., and has a sales manager to supervise detailing and sales. The branches are as follows:

Atlanta, Georgia	Minneapolis,
Boston,	Minnesota
Massachusetts	Portland, Oregon
Chicago, Illinois	San Francisco,
Cleveland, Ohio	California
Memphis,	Los Angeles,
Tennessee	California
Dallas, Texas	Philadelphia,
Kalamazoo,	Pennsylvania
Michigan	Mount Vernon,
Kansas City,	New York
Missouri	

To assure equal distribution and rapid turnover of branch stocks, individual branch inventories are regulated by a Central Stock Control Department located at the home office in Mount Vernon. Branch inventories are maintained at a level of a few weeks anticipated sales requirements. These inventories will vary from product to product and are based upon such factors as past sales history, special promotions, seasonal requirements, etc.

For the full line of products the sales representatives are expected to function in two capacities: (1) as a means of carrying information on new and old products to the physician by personal interviews and distribution of literature and samples (in other words, he is what is referred to as a "detail man"), and (2) as a means of carrying a similar message to the pharmacist, at the same time endeavoring to keep the drug store properly stocked with Stanry merchandise, again both old and new items.

A very broad promotional program, pointed at the physician and pharmacist, is carried out by professional journal advertising, lay-journal advertising (institutional advertisements), direct mail advertising, and the use of professional displays at medical conventions. A quarterly journal, *Drug Seminar*, is distributed to the medical and allied health professions, and technical



films based upon Stanry products and their uses are available to these groups.

In 1952, the reports from the market research department indicated reasonably good development of the market areas for all the products, except one, Chloresium toothpaste. In 1951, the major toothpaste and powder—in order to stimulate sales—had added chlorophyll to their formulae. This was preceded and then followed up with a national advertising campaign.

The economy-size toothpastes in direct competition with Chloresium toothpaste both contained 3¾ ounces of toothpaste. However, the competitors' products sold at a minimum fair-trade price of 69 cents while Chloresium sold for 73 cents. Sales volume in the toothpaste field increased by 6.5 per cent in 1952. Chloresium sales had maintained a steady rate throughout the year. Further, a survey showed that of 1,100 drug stores surveyed, each one had in stock only one piece of Chloresium toothpaste. Also the stores did not sell more than nine pieces of Chloresium during the year. For a detailed item this indicated a good stock turn. However, it also indicated a limited or specialized use of the product. The Stanry Company, naturally, had been first in the field with a chlorophyll toothpaste, but because of uncertainties as to its common use, had detailed it to doctors and dentists to be recommended in serious tooth and gum disorders.

The sales manager, Charles Murray, wanted a change in policy. He wanted to enter the competitive field of toothpastes and powders using a national advertising campaign and point-of-sale displays. Being the first to use chlorophyll in a healing, cleansing and deodorizing item was to be the major advertising factor. On the toothpastes the pharmacists would be allowed a quantity discount amounting to a 40 per cent

mark-up on three dozen packages. A compact display one-foot high and one-foot square at the base would be designed for counter use. This display could hold the entire three dozen. The company president, George Rogers, wished to maintain the existing company selling policies.

Question: Should the Stanry Company go into the highly competitive toothpaste market? Would the company's potential carry the sales manager's plan?

4. Highbrow Drug Company—analysis of sales potential. Submitted by Professor Evanson of Purdue (Indiana).

The Highbrow Drug Company is a manufacturer of prescription specialty products. The research and development department has discovered a new product which has potential real value in the treatment of an ailment common in adults between the ages of thirty and fifty years. The company can command patent rights on production methods and formulas and trademark rights on the product name. The vice president in charge of marketing feels reasonably certain that, according to his knowledge of research going on in the industry, there will be little or no competition for at least five years.

It has cost the company upwards of one million dollars in basic research and applied research to put the product in a condition to be marketed. It is expected that it will cost the company another \$100,000 to get the product into the channels of distribution and another \$50,000 in market research to be certain of the potential need and sales. At the present time medical research indicates that this product is of value for a disease which afflicts an average of 10 per cent of the people in the age group, and that there is little likelihood of any type of preventive medication becoming available at any time in the near or distant future.

This product affects a complete cure once the disease has been contracted, and it is to be marketed in amounts which will effect the complete cure in one purchase. The cost of a single purchase-unit (or cure-unit) of the product has been estimated at \$15.50. It is proposed to sell it through the wholesale channel at a price to the wholesaler of \$18.55 to be resold to the retailer at a price of \$21.66 to be resold to the consumer-patient on the basis of the pharmacists' particular pricing practices. The product is not to be placed on "fair trade."

It is expected that, according to company policy, this product should return its research costs and make at least a 10 per cent net profit before taxes during the first three years after it goes on the market. The board of directors might possibly extend this period to five years, if the vice president can show that there is the possibility of sustaining a market that long before demand slacks off or competition moves in to take some of the business.

The board and the president have instructed the vice president to study the population expectations, potential drug business prescription expectations, the nature of sales for the product, its potential profit, and any other facts or factors which may have a bearing on this problem, and to suggest a decision on the possibility of successfully marketing this drug. Assume that you are the vice president in charge of marketing and prepare yourself to answer the board. The last vice president made an error in judgment and now works for the Flubup Company as a junior market analyst.

5. Main Street Pharmacy—An analysis of expense and profit control. Submitted by Professor Evanson of Purdue (Indiana).

The Main Street Pharmacy was located on the corner of 12th and Main

Streets in a midwest city with a population of 46,000 and an estimated trading area of 60,000. There were twenty-eight other drug stores in the city, of which ten were considered as direct competitors, the closest being one block away toward the center of town. The city also contained twenty-six dentists and fifty-eight physicians. Three of the dentists wrote prescriptions occasionally. All of the physicians dispensed and prescribed, and all were represented in this store's files.

The store was 18 feet wide and 77 feet long, and the prescription department covered an area 13 feet wide by 11 feet long in the rear, left-hand corner. All excess merchandise for all departments was stored in the basement. The layout was departmentized as much as possible with all merchandise along the inside wall in shelf cases, floor cases and open gondolas. The fountain occupied the outer wall with a 40-foot bar and counter extension plus 25 feet of tables and chairs—or about 40 per cent of the total selling area. A small magazine rack and two telephone booths took up the remainder of the wall to a door which opened for two-way traffic onto 12th Street.

The prescription department was not prominent but was semi-open, neat and clean, had sufficient work space for one pharmacist plus a visible refrigerator, and was painted white. Selling was carried out on a service basis with some self-selection displays. The store front was not unattractive but was not necessarily prominent, and it featured windows across Main Street and extending 24 feet along 12th Street. Displays were changed monthly on a rotation basis and were never high enough to prevent full vision into the store.

Store personnel consisted of the registered owner and a pharmacist employee who received \$100 per week each; two

women clerks who alternated shifts up front at \$50 per week each; a woman fountain manager who received \$50 per week but worked only during the daytime hours; a full-time waitress who received \$30 per week and worked from 8:30 A.M. to 5:30 P.M.; and ten part-time waitresses who worked peak periods and indefinite hours at 50 cents per hour. These women and girls averaged about 12.5 hours each during a week. The store was open from 7:00 A.M. to 10:00 P.M. Monday through Saturday, and it closed on Sunday at noon. The fountain was not operated on Sundays.

The business has been operating at this location for thirty-four years but has been under the ownership and management of Mr. Rothson for only the last two years. A new merchandising chain which features everything from peanuts to power lawn mowers opened a large self-service store in July, 1956, on the same side of Main Street between 10th and 11th Streets. Another chain intends to locate at 14th and Brown Streets, two blocks south and one block east of Rothson's store, within the next year; there will be two parking lots. Rothson has been a pharmacist for thirty years, during which time he has owned and operated two other drug stores prior to his present venture.

The business had a sales volume of \$99,602.86 in 1955, of which \$12,221.28 was prescription volume. At an average price of \$2.16, the pharmacists

dispensed 5,658 prescriptions almost evenly divided between new and refills. Rothson spent \$2,095.05 for advertising, of which \$419.01 was considered for professional purposes and 4 per cent for fountain merchandising. All of the program was devoted to local newspapers because of the central shopping district location. Store policy did not permit the giving of extemporaneous donations to solicitors for miscellaneous groups to prevent ill will on the part of groups to which Rothson did not wish to contribute. The store and Mr. Rothson belonged to the local drug club, the State Association and the NARD.

Table I presents the operating statement as determined from the store's records. About 27 percent of the pharmacists' time was spent in professional activities, and the men alternated shifts weekly working fifty hours each. The store operated on a cash basis with limited "crutch credit" for special customers. The owner had no annual statement of financial position for 1955 or for the previous year. The non-prescription drugs and general merchandise sales accounted for a margin of 37.2 per cent on these sales, and the fountain department realized a 43 per cent margin. Fountain wages, plus an additional 10 per cent of the owner's salary as a management assessment, were 25 per cent of fountain sales. Rothson determined all other expenses of the fountain department to be approximately 7 per cent of sales.

**Table I**  
**Statement of Income and Expense for the Main Street Pharmacy**  
**Jan. 1 to Dec. 31, 1955**

	Total	Store	Prescription	Department
Sales		\$99,602.86		\$12,221.28
Inventory, Jan. 1	\$10,756.21		\$ 2,275.16	
Purchases, Net	62,846.33		6,957.27	
Total to Acct. For	\$73,602.54		\$ 9,232.43	
Inventory, Dec. 31	10,006.72		2,510.40	
Cost of Goods Sold		63,595.82		6,722.03
Gross Margin		\$36,007.04		\$ 5,499.25
Expenses:				
Owner's Salary	\$ 5,200.00		\$ 1,404.00	
Employees' Wages	17,816.17		1,404.00	
Rent	5,775.71		618.00	
Advertising	2,095.05		419.01	
All Other Expenses	5,741.71		696.61	
Total Expense		36,628.64		4,541.62
Net Profit or Loss		—\$ 621.60		\$ 957.63

Mr. Rothson is seriously considering selling or discontinuing his business to seek employment in another pharmacy as a registered employee. He cannot understand why he is losing money when he is realizing a 45 per cent prescription margin and 7.9 per cent prescription profit, a 37.2 per cent general merchandise margin and a 43 per cent fountain margin. He considers himself an intelligent buyer and an average merchandiser.

If this were your business, what would you do—continue or close out?

Analyze this situation completely and make suggestions or recommendations to support whichever position you decide to follow.

6. The Neighborhood Pharmacy—changing a prescription pricing system. Submitted by Professor Evanson of Purdue (Indiana).

The owner of The Neighborhood Pharmacy started his business venture in 1928 in its present location. The store is one of eighty drug stores in a

city of 135,000 people and serves an area including some 5,000 potential customers. In 1956, approximately 3,000 customers were served weekly according to the cash register tapes. There were 188 physicians in the city, forty-five of whom were considered to be 100 per cent prescribers, ninety-eight of whom were known to dispense some medication as well as prescribe, and fifty-five of whom no real knowledge existed at the time. This store's prescription file accounted for 104 of the physicians and for six dentists out of an unknown number. The owner felt that he was in actual competition with only six of the pharmacies in town which were located in his immediate vicinity.

The store was 20' wide and 72' long. The back 15' were given to receiving, marking and some storage area (in addition to the basement). The next 16' were assigned to the prescription department, and the remainder was given to general merchandise related to traditional drug stores. The prescription department was remodeled in 1948 and

was both efficient and attractive, and it maintained an atmosphere akin to that of a professional pharmacy. The store front was modern and attractive and gave the store prominence in its middle-of-the-block location. The only other business in the block was a corner filling station.

The store employed four pharmacists in addition to the owner, who did not spend too much time in the prescription department because of management and other duties and some outside interests. Said owner attributed only 10 per cent of his \$100 per week drawing on store money to professional duties. He felt that a constant withdrawal of \$100

would permit his net profit to vary more directly with his volume increases for comparison reasons. He paid his pharmacists \$105, \$100, \$85, and \$75 per week, respectively, the latter salary representing a recently hired college graduate. The highest salaried man had ten years' service. It was estimated that only 16 per cent of all the pharmacists' working hours were spent in non-pharmaceutical effort. This seemed to check with an application of Dr. William S. Apple's Wisconsin Study, which showed an average of three-tenths of an hour spent for professional duties per prescription filled. Table II details the prescription volume.

**Table II**

**Prescription Data for 1956, Neighborhood Pharmacy**

Month 1956	New Rx	Refilled Rx	Total Rx	Total Volume	Average Price
January	1,556	1,346	2,902	\$ 4,435.90	\$1.53
February	1,506	1,245	2,751	4,418.55	1.61
March	1,880	1,439	3,319	5,553.85	1.67
April	1,551	1,233	2,784	4,549.95	1.63
May	1,502	1,274	2,776	4,547.95	1.63
June	1,248	1,294	2,542	4,257.15	1.67
July	1,325	1,223	2,548	4,444.50	1.74
August	1,398	1,253	2,651	4,562.60	1.72
September	1,333	1,252	2,585	4,312.75	1.66
October	1,508	1,320	2,828	4,724.30	1.67
November	1,362	1,324	2,686	4,557.40	1.69
December	1,366	1,463	2,829	4,717.30	1.66
Totals	17,535	15,666	33,201	\$55,082.20	\$1.66

The owner's basic problem existed in his prescription pricing method and its apparent results as shown by the table. An analysis of his files in a random sample showed that over 85 per cent of his business consisted of prescriptions between the minimum price of fifty cents and \$4.00. The highest price recorded was a large order of antibiotics at \$17.50. The next high was \$12.85, and there were several around this

\$12.00 plus level. It was also apparent that the pharmacists' salaries were not the highest paid in the area or in the state, but the general nature of the work made the pharmacists consider the employment superior to that offered by other establishments which filled fewer prescriptions and required more merchandising effort. However, the owner was desirous of making some changes in order to pay the pharmacists more in



line with their ability and with the going rate of \$100 to \$125 per week.

Thus the owner, having discussed the matter with several professional-store owners and with one of his university professor-friends, contemplated the possibility of revamping his pricing system to a "break-even-cost" method in order to realize a greater profit from the bulk of low-priced units as well as lowering the cost to the patient-consumer who had to have the higher cost medication.

He prepared his annual statement for 1956 and found his total sales volume to be \$127,170.52, which was broken down as follows: cost of goods, \$73,477.00; gross margin, \$53,693.52; total expenses, \$41,281.87; and net profit, \$12,411.65. His prescription department analysis showed the following:

Sales	\$55,082.20
Gross margin	24,786.99
Total expenses	21,988.20
Net profit	2,798.79
Employees' wages	\$15,943.20
Rent	336.00
Advertising	1,168.00
All other expense	4,021.00

His prescription department ratio to total store for pertinent data can be shown for their potential interest value as: employees' wages, 66.6 per cent; rent, 28.0 per cent; advertising, 89.5 per cent; all other expense, 43.5 per cent; total expense, 59.5 per cent.

The store's advertising program included \$1,359.96 spent for handbills to customers residing within a twelve-block radius of the store with the major accent on promoting the services of the prescription department. Although physicians provide prescriptions, very little in the way of professional promotion expenditure was considered of value

because of the type of store location and the scattered locations of the physicians over the city's expanse. The customer habit of returning to The Neighborhood Pharmacy because of convenience of refill privileges when needed placed the importance of advertising on local contact at the consumer level.

Questions: From the data given, determine the overhead assessment per prescription for 1956.

Suggest a manner in which the owner can develop a break-even cost method of pricing, using a percentage net-profit addition to the break-even cost, and a method which adds a percentage net profit addition to the cost of goods plus a professional fee.

To what extent would the owner have to increase his professional net profits in order to realize an aggregate net profit of 10 per cent? Fifteen per cent? Twenty per cent?

If this store dispensed five prescriptions the merchandise costs of which were respectively, fifty cents, \$1.00, \$3.50, \$5.00 and \$10.50, what would be the selling prices on the basis of (1) the sliding gross-margin method using 150 per cent, 100 per cent, 75 per cent, 66.7 per cent, and 50 per cent mark-ups in the same order as the prices are given, (2) the break-even cost method, and (3) any other standard plastic crib-sheet method?

If the same salary-to-sales ratio is maintained, how much additional volume in professional business must this store get to increase salaries to desirable levels?

7. Burns Department Store—reorganization of the sales personnel. Submitted by Professor Buatti of St. John's (New York).

In June of 1953, the Burns Store of New York City completed its plans for putting the entire store on a self-service

basis. The largest single unit of sales people was situated in the drug and cosmetic department.

Previous to the conversion to self-service the cosmetics personnel were divided into four demonstrators supplied by the cosmetic companies and eight girls hired by the Burns Store. The four demonstrators were paid by their home offices and were to report only to their respective companies in matters of pay, type of work to perform, and stock inventory. The eight girls controlled by the store were used both as cosmetic sales girls and drug sales girls. They were given training as cashiers in case they were needed in emergencies. The four demonstrators, too, were given training as cashiers. However, as explained to them by the personnel department, they were to ring up only sales which they made within their own line of cosmetics.

In the drug section there were two female pharmacists and two sales girls. State law requires that a registered pharmacist be on the premises at all times where proprietary medicines are sold. Since the store policy on the working time was a forty-hour, five-day week, two pharmacists were needed for the store was open six days a week.

The assistant buyer, according to company policy, was the liaison between the sales force, the department, and the buyer. The buyer, in turn, was to coordinate all the activities of the floor with those of the stock room in the warehouse. However, the buyer did little or nothing to coordinate these activities and remained in the store most of the time. This condition forced the assistant buyer to spend most of her time at the stock room requisitioning the stock for both of the departments.

The section manager's duties were to see to it that everything was working smoothly in the departments she had

under her surveillance. She was to assign the twenty-minute breaks and the lunch hours, seeing to it that most of the department was covered at all times. Also she was to investigate and take care of any customer complaints and exchanges.

Thus was the line of organization defined. However, under the system of self-service the selling function of the sales personnel was lost. Now the openly displayed and accessible products sold themselves. The four demonstrators had little to do. They now served only to give advice when asked by the customers and to replenish stock that was sold and maintain a stock inventory. The section manager therefore took advantage of this situation and reduced the number of cashiers in the department. There were four cash registers and wrapping sections available in the department. Two of these were designed for the use of full-time cashiers and two for the use of the demonstrators. However, the section manager sent all the girls up for cashier training and had them all serve as cashiers, leaving only one full-time cashier in the drug department.

The first outcome of this move was an open refusal of the demonstrators to serve as cashiers. They had to ring up all sales, even those of the drug department. Since they were not store-hired and paid, they resorted to refusing to ring up the sales, sending them all to the cashier in the drug department.

Another poor feature of this move by the section manager was that other cashiers had to be brought into the department from time to time to relieve the pressure of the special sales days. The complexity of calculating the city and sales taxes and dealing with drug and cosmetic products often resulted in great confusion. These cashiers who relieved were not familiar with the me-

chanics of the sales in the department and caused no end of turmoil.

Another result of this move was the animosity it created between the head of stock and the section manager. The section manager did not have jurisdiction over the personnel as to what work should be allotted to them. This was within the domain of the head of stock. Since the head of stock was a newly created position—a position which was poorly defined to the man who was put in charge—the section manager took advantage of her many years with the firm to usurp some of his powers.

This already unmanageable situation was further intensified because the eight cosmetics sales girls and the two drug sales girls were hired as such, but actually they were made to wash down

shelves and dust. The personnel department, in hiring them, had told them their principal function was that of a sales girl, not a cleaning woman and attendant.

In order to get a coordinating force and at the same time cut expenses, the company had created the position of head of stock. A pharmacist was hired to take this position. However, he was the only pharmacist in the store, and legally the store was not covered on his day off. As an over-all controller (control of stock and personnel) he failed to achieve any effectiveness. This position as such was resented by the demonstrators and section manager.

What is your suggested reorganization of the drug and cosmetic sales force?

## PHARMACEUTICAL EDUCATION IN COSTA RICA

The twenty-year-old University of Costa Rica has recently been consolidating its thirteen instructional units into an attractive suburban campus at the edge of the capital city of San José. The project is about one-half completed, and within the near future the school of pharmacy is to be transferred from its present downtown location to the new eighty-acre campus in San Pedro. Instruction of pharmacy students in the basic sciences and in nonscientific fields is already offered within several departments of the University, with only professional courses being taught in the school of pharmacy.

The University recently requested advice on curricular and related matters, looking especially toward the projected construction of a new building for the school and its transfer to the main campus. I was privileged to spend two months in Costa Rica in the summer of 1960 as Visiting Professor of Pharmacy, under the auspices of the United States Department of State. I have reported elsewhere on the development of the University (1) and on the practice of pharmacy in Costa Rica (2). This paper, therefore, will be limited to phar-

maceutical education, with the following two paragraphs taken from the paper on practice by way of introductory comment on some general characteristics of the country and its pharmaceutical organizations.

Costa Rica is a small, democratic Central American country, about the size of West Virginia, and with a population of about 1.2 million, approximately that of Maine. A large majority of the people are Caucasian, and about one-third of them live within a twenty-mile radius of San José, whose population is in excess of 100 thousand. San José is a modern, cosmopolitan, attractive city, with many parks, good hotels and restaurants, and a beautiful national theatre—the site in August, 1960, of the Conference of Foreign Ministers of the Organization of American States. A major item in the national budget is for education, and the rate of literacy is high, ranking with that of the top three among Latin American countries.

The development of pharmaceutical practice and education in Costa Rica

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has been materially influenced by four organizations: the school of pharmacy (founded in 1897 by the Faculty of Medicine, Surgery and Pharmacy created by Organic Law of 1895), the College of Pharmacists (1902), the Association of Students of Pharmacy (1941), and the National Pharmaceutical Association (reorganized in 1957). The Faculty and Student Association are obviously concerned chiefly with activities within the school of pharmacy and are discussed in some detail in this paper. The College and the National Association are nonacademic agencies whose role has been discussed elsewhere (2).

#### **History of the School of Pharmacy**

During the Colonial Period in Costa Rican history, prior to 1821, and for some time thereafter, there were no pharmacists and practically no physicians in the country (3). "Medical" services were available from untrained quack doctors (*curanderos*) who did more harm than good and who were eventually banned by law. Such practices as applying serpents to the body were resorted to, and such medicaments as could be gathered from the rich flora of the country made up the *materia medica*. A casual examination of a standard reference on Costa Rican plants (4) shows more than 100 genera that have been or still are being used as medicines. A graduation thesis by two pharmacy students (5) describes dozens of additional plants, chiefly from the central area and the Atlantic zone, that are used in the preparation of home remedies of doubtful value.

The first graduate pharmacist in Costa Rica arrived in 1849 from Nicaragua. A chair of pharmacy was listed for the University of Santo Tomas, but little or no pharmacy was ever taught. This nineteenth century University was primarily theological in nature, but it also offered formal instruction in law

and maintained a preparatory department. Its lifetime extended from 1843 to 1888, when it was legally abolished on the basis that its antiquated organization was not suitable for the country's needs and that the limited resources of Costa Rica must first be devoted to development of primary and secondary schools.

In 1857 pharmacists were grouped with physicians, surgeons, dentists, and midwives in a Medical Society. At the time there were eight pharmacies in San José. A pharmacist trained at the Hospital of San Juan de Dios was "graduated" in 1877.

A revised Organic Law for the health fields created the Faculty of Medicine, Surgery and Pharmacy in 1895, and pursuant to this law a school of pharmacy was established in San José in 1897. Thirteen students embarked on a four-year course of study that year, under a faculty of four professors, all of whom were foreigners. The first class of six pharmacists was graduated in 1900. In 1902 formation of the College of Pharmacists provided an agency outside the school to aid in its support and development. The College of Pharmacists is one of several such legal agencies in the professions, all known as Colleges. The objectives of the College of Pharmacists include promotion of the profession, support of the school of pharmacy, and regulation of the importation and sale of drugs and medicines.

During the early years of the school of pharmacy the principal administrative officer was termed "Inspector." In 1916 the title was changed to "Director," and upon creation of the University of Costa Rica in 1940 this title was replaced by "Dean." For more than forty years the school of pharmacy functioned as an independent institution.

During the first thirty years of its life the school suffered the vicissitudes



characteristic also of the early North American independent colleges of pharmacy. Preoccupation with provision of suitable quarters for the Costa Rican school was present from the start. Various buildings were utilized, and in 1917 a disastrous fire dramatically emphasized the need for an adequate school of pharmacy building. The staff at that time consisted of part-time teachers, and relatively little laboratory work was provided. The school day was a matter of a few hours in the morning with the students working more hours than they spent in school. This pattern, of course, was also common in the United States fifty years ago and earlier.

These disadvantages notwithstanding, the school of pharmacy was the principal center of scientific instruction in Costa Rica during the first four decades of the twentieth century. As a consequence, a great many licensed pharmacists taught chemistry and botany in high schools, usually as a part-time adjunct to their regular professional activities. This situation is still common, even *egresados* and upperclass students in pharmacy serving as part-time chemistry teachers in high schools. An *egresado* is a student who has completed all course work in a field of study, such as pharmacy, but who has not completed a thesis required for graduation. He must complete the thesis before he will be certified by the University to the College of Pharmacists for membership in the College (equivalent to registration in the United States). As the relatively new department of chemistry of the faculty of sciences and letters grows and supplies greater numbers of chemists, demands on pharmacists for teaching will probably lessen.

Eventually a building of its own was provided for the school of pharmacy with financial aid from the College of Pharmacists and from the Congress of the Republic. The new building was

occupied in 1929 and still houses the school. It is of classical square design with a central unroofed court from which the classrooms and laboratories open. The principal deficiencies in the building are with respect to laboratories. None is provided for pharmacognosy, pharmacology, or dispensing pharmacy. Pharmacognosy laboratory has been taught since August, 1960, in temporary quarters nearby. Plans are also under way to provide for laboratory instruction in pharmacology in temporary quarters. These temporary laboratories will not be adequate for the demands of the new medical school as regards pharmacology, and this situation emphasizes the need for new quarters for the school of pharmacy, since pharmacy is to teach the pharmacology courses required in medicine.

Incorporation of the school of pharmacy within the University of Costa Rica in 1940 did not at first result in any substantial change in policy or mode of operation. The school continued as a self-contained institution offering all courses of its curriculum itself and operating with a part-time faculty. In 1951 a five-year educational program in pharmacy was started and the four-year program was abandoned. From 1951 to 1957 the program was 0-5 in pattern, but in 1957 a 1-4 program was introduced with instruction during the first year given in the department of general studies of the faculty of sciences and letters of the University.

#### Staff

The instructional staff in pharmacy consists of twelve teachers, about one-half of whom are relatively recent graduates of the school of pharmacy. The other members, all graduates of the school of pharmacy, are men who have behind them long careers in teaching at the school, more than thirty years in the case of the dean and more than

twenty years for each of three other members of the staff.

Until recently none of the staff members was employed on a full-time basis, but a trend toward greater use of full-time teachers is evident. The dean is employed full-time, although much of his time is devoted to administrative duties at the school and elsewhere in the University. A younger staff member is also employed full time, with about one-half of his time given to supervising the thesis work of *egresados*. Two of the older men on the staff are not employed full time by the University, but since neither has duties other than at the school much of the time and energy of each are devoted to his teaching. With the exception of anatomy and physiology, none of the courses taught by the pharmacy staff is basic. The principle of having basic courses taught in the departments of general studies and of the basic sciences has been adopted almost 100 per cent, therefore, in the school of pharmacy.

All of the commonly recognized areas of professional instruction are represented by one or more members of the faculty: pharmacy, pharmaceutical chemistry, pharmacy administration, pharmacognosy, and pharmacology. Courses in none of these areas are taught by teachers who would be considered completely qualified by virtue of formal advanced study. In three areas (pharmacy, chemistry, pharmacology), however, teaching is in the hands of men with years of experience behind them, and, in the case of pharmacology, with one year of work in a research laboratory in England prior to World War II. The teachers in pharmacy administration and in pharmacognosy are young men of ability, both of whom are seriously working to improve their qualifications, one by studying locally in the school of economic and

social sciences, the other by continuing in Costa Rica research started at the University of Wisconsin during a year of graduate study there.

The studies of the staff member being undertaken in economics are under a University plan for upgrading staff members and termed "independent attendance." A teacher exercising the privilege of independent attendance takes a course more or less *in absentia*, receiving help individually from the teacher, attending classes at his own option, studying on his own, and taking the regular examinations. If successful in these, he receives credit for the course. These commendable efforts at improvement notwithstanding, the school of pharmacy does not compare favorably with such other scientific units of the University as the departments of biology, chemistry and microbiology with respect to formal modern advanced study by members of the teaching staff. This fact is, I believe, freely recognized at the school, and steps are being taken to improve the situation.

The school, for example, exemplifies the two most feasible means available for more adequate preparation of staff members: formal study in other units of the University under the plan of independent attendance, and graduate study outside the country. (I emphasize "formal" because "informal" improvement has been common over the years. One should not underestimate the very real scholarship of many members of the University staff undertaken on their own initiative. The dean of pharmacy, for example, is proficient in English and French and, to a lesser degree, in German, and much of this proficiency has been self-taught.) In September, 1960, the teacher in charge of the courses in quantitative pharmaceutical chemistry began studies at the University of Kansas in the field of chemistry.

### Students

The number of students enrolled in the school of pharmacy in 1960 was seventy-three. An unknown number of prepharmacy students was enrolled in the school of sciences and letters. The numbers in the last four years of study in the school of pharmacy have declined steadily during the past seven years, in sharp contrast to the steady increase in population in Costa Rica (Figure 1). One factor that may have contributed to the decrease in numbers of students is the new areas of science that have been expanded or opened to Costa Rican students in their own country, for example, chemistry and microbiology.

Another factor is quite certainly the increased academic requirements brought about by transfer of all basic instruction to other units of the University, and particularly by the rather rigid first-year requirements in the department of general studies. Still another factor may be the too rigorous requirements for graduation of the school itself. Whatever the reasons, if the trend depicted in Figure 1 is not soon reversed, the profession of pharmacy in Costa Rica will face a manpower shortage of considerable proportions within a relatively few years.

Strong and favorable impressions concerning the general ability, courtesy and responsibility of the students in pharmacy were formed during several weeks of almost daily contact with and observation of them at the school of pharmacy. An index of their judgment and responsibility is given in the report of their Association to the Pharmaceutical Seminar held in October, 1960, under the auspices of the College of Pharmacists and the National Pharmaceutical Association (6).

In this report the following deficiencies and anomalies at the school are enumerated: inadequacy of the build-

ing; inadequacy or absence of certain specific laboratories; disadvantages resulting from a part-time staff; lack of text and reference books; failure of the title conferred at the completion of all requirements to indicate the extent of training in chemistry; failure of the internship requirement to fulfill its objectives. It seems to me that each of these points is well taken. In only one instance am I inclined to question a contention in the report—a statement that pharmacy students appear to be discriminated against in the chemistry department. If this is true, it is a rather serious matter, and it may well be exaggerated in the eyes of the undergraduate student.

### Curriculum

The original four-year curriculum of the school of pharmacy was a four-year program in name, but it was probably more nearly equivalent to a two-year program of full-time study. This situation has not only changed during recent years but has gone to the opposite extreme, wherein what appears to be a five-year is actually at least a six and one-half year curriculum. In addition, extracurricular graduation requirements add another six months or so for the average pharmacy student.

Relatively few students (pharmacy or otherwise) complete the requirement of the prepharmacy year of general studies in one year. Students are not permitted to enroll in pharmacy until this year is completed; so failure in one course during the first year automatically adds a calendar year to the program in pharmacy. This situation seems to me to be rather hard on a student who may have the potentiality for successful work in pharmacy but who has not got off to a flying start.

During the prepharmacy year the student carries seven courses: Spanish, fundamentals of philosophy, history of

culture, sociology, general mathematics, general biology, and general chemistry. Several teachers in these courses maintain that most students come from high schools poorly prepared (as common a complaint in Costa Rica as in the United States), and yet these students are expected to carry a program each semester of thirty-three and one-half hours credit, equivalent to approximately twenty-five semester hours as these are ordinarily calculated in North American colleges.

The load for each of the four years in the school of pharmacy is not quite so heavy as for the year in general studies, but it is still somewhat unrealistic, it seems to me. In contrast to the sixty-seven semester hours of the pre-pharmacy year, in pharmacy the semester hours for the four professional years are respectively sixty, fifty-two, sixty-six, and sixty-two. The practice of specifying credits in semester hours is not followed at the school of pharmacy, but for purposes of comparison with courses in the school of sciences and letters and in foreign schools I have calculated the values, using the system followed by other units of the University (chemistry, for example). This system has the advantage of giving at a glance a quantitative value to various courses and to the curriculum as a whole. The total for the five years is thus 307 semester hours of credit. This is equivalent to about 230 semester hours as calculated in North America, an average load of about twenty-three "North American" credit hours per semester.

Some general relationships among various types of courses in the pharmacy curriculum are depicted in Figure 2. The so-called "balanced" curriculum is a theoretical one more or less in line with recommendations outlined in *The Pharmaceutical Curriculum* (7). As indicated in the two circles at the top of the figure, the balance between profes-

sional courses and cultural and basic courses in the five-year pharmacy program in Costa Rica is only a little in favor of the professional courses. Certainly this deviation from the balanced curriculum is of no importance.

However, the two bottom circles indicate a heavy load in mathematics and the physical sciences. The curriculum has no electives, and it seems to me to be somewhat limited in pharmacy courses. The equal distribution in the balanced curriculum among courses in the physical sciences, biological sciences, pharmacy, and cultural courses plus electives respectively is, of course, only approximate. A weighting of any one area at 30 per cent or even more of the total program with consequent reduction in the three remaining areas might be quite defensible, but not a weighting of as much as 50 per cent in any one area.

The rising significance of the biological sciences has been a common topic in meetings on pharmaceutical education in the United States since the 1930's (8, 9, 10) and the imbalance commonly found between the physical sciences and the biological has been widely debated. In recent years this imbalance has been fairly well corrected in many schools of pharmacy outside Costa Rica, not only in the United States, but in Canada, Puerto Rico and many European countries.

This matter of imbalance leaning heavily toward chemistry can also be visualized by noting the semester credit hours devoted to various fields during the five years of the Costa Rican curriculum. Nonprofessional courses are divided as follows: mathematics and physics, twenty-two semester credit hours; cultural courses, thirty-two; biology, thirty-eight; chemistry, fifty-one. In the five areas of professional instruction the division is: pharmacy adminis-



tration, four credit hours; pharmacognosy, six; pharmacology (including first aid), twenty-eight; pharmacy, forty-nine; pharmaceutical chemistry (courses labeled "applied"), seventy-seven.

These data are based on the curriculum outlined in the 1959-1960 catalogue of the University (11) as corrected in a few instances by professors in charge of the courses in 1960. The curriculum as outlined in the last edition of the published regulations of the school (12) has been substantially modified during recent years, principally by addition of chemistry courses.

### Teaching Practices and Problems

The lecture method is the principal means of instruction in the school of pharmacy, as it is in most units of the University. Students in pharmacy spend more hours in writing material from dictation and copying material written on the blackboard than in laboratory work, discussion, and independent study taken together. Nearly 70 per cent of the clock hours spent in school by the student in pharmacy is devoted to lectures.

The laboratory method of instruction employs about 30 per cent of the pharmacy student's time during the five-year program. Nearly three-fourths of this laboratory study is in chemistry, basic and applied. Most of the balance is in basic biology, except that no laboratory work is given in anatomy and physiology. No laboratory work is given in pharmacognosy or pharmacology, other than the small amount of laboratory instruction in pharmacognosy introduced during the latter part of the 1960-1961 academic year. Detailed plans for laboratory work in pharmacology for students in pharmacy are not formalized as yet, although by March, 1962, the school of pharmacy is obligated to offer a laboratory course in pharmacology for students of the school of medicine (scheduled to open in March, 1961).

Two licentiates in pharmacy are currently studying pharmacology in the United States, and it is anticipated that they will return to the school of pharmacy in time to instruct in this course.

In the pharmacy area no laboratory work is regularly scheduled for the courses in pharmacy technique, official pharmacy (two years), or magistral pharmacy (dispensing pharmacy, one year). Occasionally some laboratory work is introduced at the discretion of the professor in charge. The one-year course in industrial pharmacy includes five hours per week of laboratory instruction consisting of a combination of exercises in galenical pharmacy, small-scale manufacturing, compounding, and cosmetology.

A major problem in the teaching program of the school of pharmacy arises from the scarcity of pharmacy textbooks and reference works in the libraries of the University, the school of pharmacy, and the individual student. There are very few books and no journals on pharmacy proper at the University Library, and about four dozen books only at the branch Dentistry-Pharmacy Library. Most of these are outdated. Each professor has his own collection of books from which he makes personal loans to students as the occasion may arise. The individual student is required by school regulation to have a copy of the last edition of the *United States Pharmacopeia*. Some students own in addition a *Remington's Practice of Pharmacy*. These books plus two mimeographed Spanish publications in pharmacology by Professor Azofeifa of the school of pharmacy and one on industrial pharmacy by Professor Miranda constitute the total private pharmaceutical library of many of the upperclassmen in pharmacy. Many students graduate without seeing even a half dozen standard modern works in the areas of professional pharmaceutical education.



### **Practical Experience Requirement**

The University of Costa Rica has been given the authority to certify its graduates to the several legally authorized professional agencies (colleges) as qualified to practice their profession. The only pharmacy internship requirement, therefore, is that specified for graduation from the school. This is currently outlined in the school's regulations as consisting of 1,200 hours of practical experience, 600 of which must have been acquired prior to the beginning of the senior year. At one time the requirement was 2,400 hours, but as more laboratory work was introduced in the school fewer hours of practical work were considered necessary. Fulfillment of the present-day requirement is not strictly controlled, nor is an attempt made to check on the outlets in which it is met or to supervise the internship in any way.

Some of the students expressed the opinion that the internship requirement as currently administered was not worthwhile and that it fostered exploitation of students who were obliged to acquire practical experience as a graduation requirement. In order to document this opinion officers of the Student Association polled forty-three pharmacy students in the upper three classes (eight others mostly in the second-year class were not included) as regards hours of work per week and salary. Some of the data obtained are summarized in the Addendum.

Of the twenty-three students who work in some field of pharmacy (45 per cent of the members of the three upper classes) six receive no salary at all at the pharmacy job, but three of them have an additional nonpharmacy job for which they are paid. The salary range for work in pharmacy is wide: nothing to seven colones per hour. (A colone is currently valued at fifteen cents, USA). The last figure is most

exceptional and is approximately the legal minimal requirement for salaried licensed pharmacists (1,200 colones per month). Five students receive three colones per hour or more, and in most cases these are students with a great deal of experience in the practice of pharmacy.

### **Conclusions**

Quite apart from such ponderable qualities as laboratories, libraries and semester hours of credit, probably the most significant criterion of the value of any educational institution lies in the performance over the years of its alumni. It is ordinarily difficult to obtain reliable information on such performance. Costa Rica, however, presents a somewhat different situation in this respect.

The country is about the size of West Virginia; it has about the same population as Maine; 79 per cent of the alumni of the school of pharmacy work within a radius of fifteen miles of the University; and the present dean has been active in the affairs of the school for more than thirty years—as dean for nearly twenty-five years. These factors have made it possible to learn a great deal about the contributions of the pharmacy alumni to Costa Rican life and health—from the dean, the secretary of the school, staff members, and personally from an appreciable number of the graduates of the school.

A sizable majority of the alumni are engaged in practice in pharmacies, drug-stores, laboratories, wholesale houses, hospitals, or as medical visitors. I firmly believe the services rendered by these pharmacists are at least as useful and effective as those rendered by pharmacists in these same pursuits in the United States, and I have a healthy respect for the services rendered by North American pharmacists considered as a group. On this basis, I believe the

school of pharmacy of the University of Costa Rica has fulfilled its mission in a highly creditable fashion over the years. Further evidence in support of this contention is found in the unique service that Costa Rican pharmacists render as teachers in the country's high schools, of chemistry and botany especially, and the distinctive services of individual pharmacists in such nonpharmaceutical fields as politics, government, business administration, and public health.

In order for the school of pharmacy to serve the people of Costa Rica in the future as effectively as it has in the past, efforts are being made to improve the educational program in pharmacy. This is true not only within the school but also in other pharmaceutical agencies in the country, notably the College of Pharmacists and the National Pharmaceutical Association. My sincerest wishes for success in these efforts are extended to the many friends and colleagues working for the betterment of pharmacy in Costa Rica.

**Fig. 1**

**Relationship of the number of students in the last four years of study in the School of Pharmacy, University of Costa Rica, to population of Costa Rica, 1954-1960**

\_\_\_\_\_ number of students, multiply by 10; ..... population, multiply by 100,000.

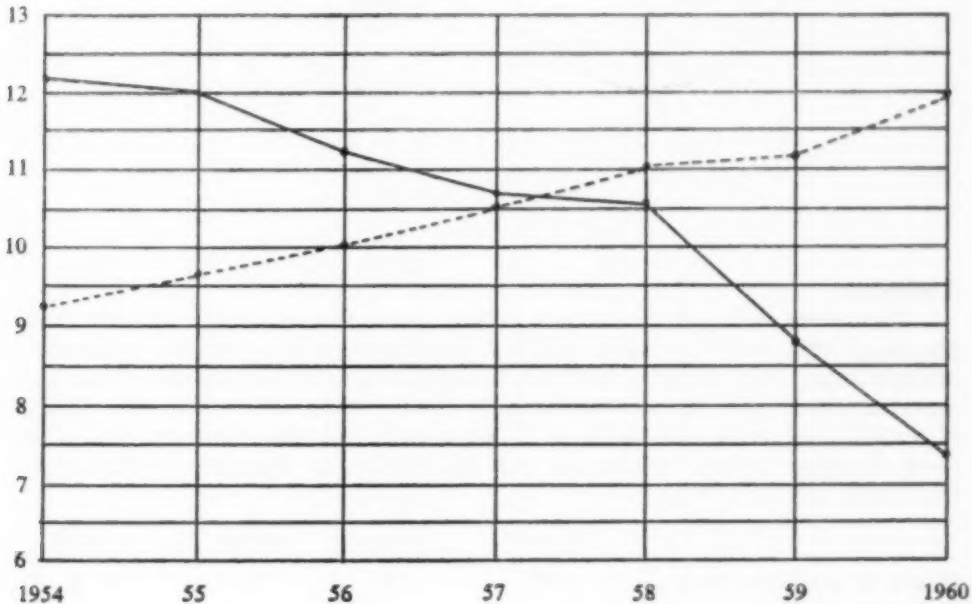
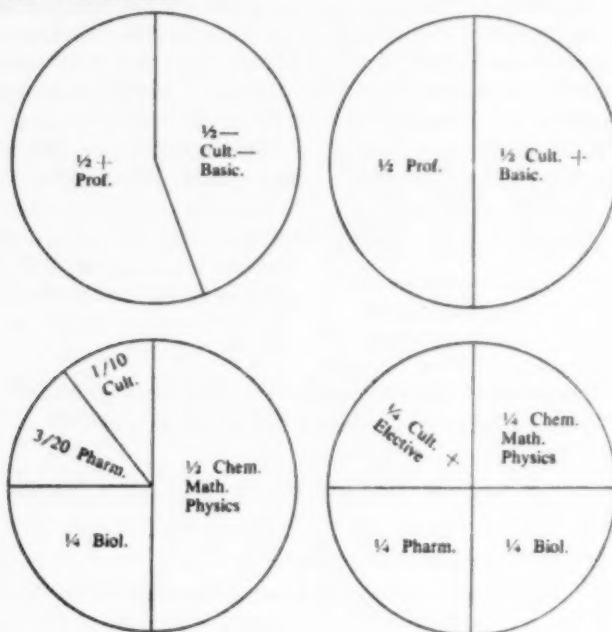


Fig. 2

All courses in the 1-4 pharmacy curriculum: left: University of Costa Rica; right: "balanced" curriculum



#### Addendum

Data from twenty-three students in the upper three classes of the school of pharmacy who work in some field of pharmacy (retail, hospital, wholesale, manufacturing). Not included in this table are twenty-eight additional upperclassmen: seventeen who do not work, eight from whom data were not readily obtainable, and three who work at nonpharmaceutical jobs. Data for this table were furnished by the officers of the Association of Students of Pharmacy, University of Costa Rica.

	range	mean	median	mode
Hours of work per week:	5-42	24	26	26 & 30
Colones* per hour:	0-7	1.8	1.5	1.5

\*The colone is currently valued at fifteen cents, USA.

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MELVIN W. GREEN\*

## CREATING A CLIMATE FOR BASIC RESEARCH IN THE PHARMACEUTICAL SCIENCES\*\*

To start a discussion relative to creating a climate for basic research in the pharmaceutical sciences should embrace, ordinarily, a definition of basic and applied research. I am sure that you have shared with me the experience of wading through gallons of printer's ink on this subject without much enlightenment. To define such a difference in the pharmaceutical sciences, which are said to be applied sciences, becomes an even greater task. This all suggests that the matter is a relative one. For example, I can visualize a pharmaceutical chemist preparing a series of organic compounds that he hopes will possess physiological activity. It may happen that, in the series of compounds in question, the organic chemistry involved is exceedingly pedestrian and that the research can be said to be fundamental only in that several of the organic compounds prepared have never been made before. Under such circumstances it is likely that the chemical

characterization of these compounds is also quite routine, so that, in the aggregate, it can be said that the chemical research involved in the problem is not the basic one. On the other hand, it is possible that in the process of determining the physiological activity of these compounds, some basic relationships will be disclosed, opening up whole new concepts in the biological area, and thus the total research can be said to be basic. Using the same type of example, however, the reverse may be true. It may happen that basic syntheses in the area of organic chemistry will be developed in the process of working out a series of compounds and that, in the process of proof of struc-

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\*\**Presented at the dedication of the Pharmacy Research Building, University of Michigan, December, 1960.*



ture, chemical and physical-chemical theory may be evolved to the point where this can be said to be a contribution in the basic area of organic chemistry. On the other hand, the process of biological testing may turn out to be a routine, applied matter of little significance.

We may as well begin, however, by conceding that more and more the collective sciences which pass under the name of pharmacy emerge as applications of physics, chemistry, mathematics, and biology. The five basic areas which traditionally constitute areas of instruction in the colleges of pharmacy, namely pharmacy, pharmaceutical chemistry, pharmacognosy, pharmacology, and pharmacy administration, are all essentially applications of other more basic and well-defined fields. While these areas are all admitted to be applied ones, it is possible to approach research within them in a more basic way than is often done.

Let us examine some of the ways in which these approaches can be made more basic. First of all, it would appear necessary to create the proper physical environment. Since all of the sciences, or at least those drawn upon for pharmacy, have developed to the point where scientific instruments of considerable sophistication are necessary, it is obvious that such instruments must be present in the pharmaceutical science laboratories. Spectrophotometers, recording spectrophotometers, equipment used in the measurement of various properties of isotopes, multi-channel polygraphs, encephalographs, polarographs, refractometers, and countercurrent extraction apparatus are all commonplace equipment today. The mere possession of such apparatus, however, is no guarantee that their utilization will be confined to basic studies. In fact, the opposite is apt to be the case since it is tempting, after having mastered a com-

plicated instrument, to utilize it for routine and inconsequential studies.

Of even greater importance in relation to physical environment, however, is the contact with the basic science specialists within the framework of the university. In a great university of the size and quality of the University of Michigan, for example, the very air one breathes is saturated with basic science research that has a distinct bearing on the pharmaceutical sciences. It is a source of disappointment to observe that in many colleges of pharmacy the research workers completely isolate themselves from these other basic science workers and often have no knowledge or only a limited knowledge of the basic research techniques and philosophies that are employed as close as the same building. Often consultation with these other scientists would lead to a much more fundamental and scientific approach to the pharmaceutical problems under study.

Related to environment is the matter of selection of courses for the training of graduate students who will ultimately become the research workers in the field. In the first place, in many colleges of pharmacy there is far too much emphasis on graduate course work within the halls of the college of pharmacy itself. Strong basic courses in such fields as organic chemistry, biochemistry, physiology, pathology, bacteriology, genetics, physics, mathematics are badly needed if the student is to learn perspective. Even in the advanced applied courses, reading assignments in the more basic classic scientific literature are frequently called for in order to assure that the graduate student will have a thorough appreciation of fundamentals. Some of the most basic understandings come from some of the older papers and should not be lost sight of by the present-day pharmaceutical scientist. Some of the classic papers of Otto

Loewi, Hudson, Claude Bernard, Ehrlich, Tschirch, Cannon, and others still have considerable meaning in the training of a novice.

The research training of the graduate student also plays an important role in this regard, although it seems superfluous to mention it at the University of Michigan. It might be profitable to look at some of the applied pharmaceutical science fields with respect to the ways in which they are rendered more basic. In the field of pharmaceutical chemistry, for example, there are many research areas that can be quite basic, as has been so well demonstrated by your own Dr. Blicke. It is not always so, for, in the matter of the structural determination of complex natural occurring substances, as an example, there is presently much superficial work, remote from fundamentals.

It is not unusual to see problems involving the production of a sizable number of organic compounds of a given series in the hope that one or more of these will be a useful and marketable drug. The likelihood of arriving at a marketable drug is very slight when one recognizes that in industry teams of organic chemists are assigned such problems and literally hundreds of compounds are made in order to obtain one which may be marketable. This in many instances would seem to be an applied area that had better be left to the industry. Attempts in depth to relate chemical structure to physiological activity definitely belong in the university pattern, however. Relating structure to function calls for an enlarged understanding of cellular biochemistry and physiology as well as understanding of the chemical configuration and constellation of rather complex molecules. The development of the concept of competitive inhibition in biochemistry, and a realization of the importance of nucleoproteins in biological

phenomena, particularly those involved in heredity, open up whole new fields of thought in structure-function relationships.

The experiences with the structural determination of penicillin focused attention on the importance of modern analytical tools and physical methods as an approach to structural understanding. This fundamental approach can open up many opportunities in pharmaceutical chemistry as a linkage between the more theoretical research and the strictly applied and practical drug assay. That there is a considerable demand for analysts with such a background is evidenced by the fact that in industry the analytical research division often exceeds the analytical control division in size.

The field of pharmacognosy, which is basically a biological one, recently has been strengthened by the use of the powerful tools of the physical chemist, the biophysicist, and the phytobiochemist. It is now generally recognized that the morphologic and taxonomic approach to this science as it was carried on in the not too distant past has passed its zenith, if indeed it ever was really productive.

The application of tissue culture techniques to plants in their relation to drugs is a field with almost infinite possibilities. It is disappointing to recognize that a great deal of the literature in this field, although it has a relationship to the drug field, has been carried on in laboratories other than pharmacognosy laboratories. Studies of the type represented by that of R. F. Dawson on the biosynthesis of the nicotiana alkaloids certainly belong in pharmacognosy laboratories. Biosynthesis studies in the lower forms, when drug-related, are also pharmacognostical in outlook and can be considered to be more fundamental. The biochemical metabolism of plant tissues in relation

to their response to drugs and the production of drugs during metabolism certainly fall in this same basic category. Attempts to determine the purpose to the plants of drugs and vital substances like vitamins that they produce are also a type of basic study that could well go on in pharmacognosy laboratories and frequently does.

Pharmacognosy is one field that would appear to the writer to be worthy of much stronger support than it is now getting in most colleges of pharmacy. In the first place it is the one field that is decidedly unique to pharmacy. There is no pharmacognosy institute in the United States analogous to our pharmacological and chemical institutes and such might be well worth the development at a college of pharmacy, or even as an independent institute on the outside, but preferably with some university connection. Since nature has a habit of creating many molecules that are difficult, if not impossible, to duplicate in the laboratory, it would appear that a really concerted effort to unravel some of the mysteries of drug creation at the plant level should be useful as a stockpile of basic concepts and facts for practical utilization elsewhere.

The restricted area of pharmacy, especially in the past, has been the pharmaceutical science most guilty of being strictly applied and not utilizing basic approaches. The tendency has been to develop dosage forms on a strictly empirical basis with the subsequent utilization of very little science. During a period when most medications were of the type generally classified as galenic and were quite unsophisticated, such an approach probably was as good as any. The nature of present therapeutic agents and the demands for unique dosage forms are such that today this approach no longer can be utilized effectively.

The actual production of dosage forms for commercial utility in the university is usually of little value as contrasted to such development in industry. It would seem, therefore, that the college of pharmacy should restrict itself to the scholarly development of information, techniques and approaches that can be utilized in practical formulation by those who have completed graduate instruction and gone into industry, where their services are so much in demand.

There are many types of problems that can be cited as being basic, scientific approaches to a very practical and applied matter. Studies of the complexing of drugs with excipients and other pharmaceutical entities which are present in dosage formulations but are physiologically inert themselves are useful in building up a stockpile of information for the industrial pharmacist. Studies of the complexing of drugs with cellular constituents are likewise valuable, since such reactions often influence pharmacologic response of drugs. Since, in formulation work, drugs often are deliberately adsorbed on various excipients and then caused to be released into the tissues at controlled rates, fundamental studies of adsorption and elution properties of drugs under controlled laboratory conditions are of value.

The engineering of processes related to drug production can often yield information of considerable industrial value also. The instrumentation of a tablet compressor, so as to permit detailed studies of what is going on during the compression process, can be of basic value in formulation as well as make a contribution to compression physics. Studies of the interaction of drugs in solution with the walls of glass and plastic vessels and stopper materials are also more basic studies which are capable of yielding practical

results at the industrial level when properly applied.

The next phase of academic climatology to be discussed is a matter of the students themselves. The recruitment of properly oriented students for graduate work in the pharmaceutical sciences is known to be not easy. While the immediate task is to select from those who are currently in undergraduate programs or who have completed such programs recently, the solution to the basic problem must start earlier. Unfortunately at the undergraduate level we do not really know the motivations that encourage people to go into the profession of pharmacy. In fact there are very few discriminating data available which indicate the kinds of people who go into pharmacy. This is an area of sociological research that is badly needed for the profession. The only study with which the speaker is familiar is one that was made a number of years ago and suggests that the persons entering pharmacy are much more oriented toward business in their interests than they are toward the sciences. There are impressions that there are other factors that influence persons to go into pharmacy which are more closely related to family background and to economic and social status. Until we have a better understanding of the motivations at this level, it is difficult to carry it the one step further to the graduate level.

That the problem of getting more able students into graduate programs is not unique to pharmacy was delineated by President Harold Taylor of Sarah Lawrence College. Dr. Taylor points out that if each child is to grow up to take his rightful place in American society he must have access to good education throughout his childhood so that his latent talents can be revealed and nurtured. Beyond this, however, is personal motivation which determines whether he

makes the effort to go further with his education. Personal motivation may come from such sources as the amount and quality of family conversation at the dinner table, the ambition of a mother for her sons, or the stimulus of an outside, rather casual, contact. The pattern of values and attitudes in the family is quite varied among people in different income and social groups. This, in the opinion of Dr. Taylor, has a definite bearing even on recruitment for college, let alone for a profession or additional graduate education.

A second factor in motivation is the public image of the profession. Studies have shown that the public image of the scientist and the teacher is not especially good in the United States at present. One of the chief referents in such image-making, unfortunately, is income. Fortunately there are signs of the improvement of these images.

A third factor, in the opinion of President Taylor, is the educational system itself. Where schools and colleges build different attitudes within their communities, and where teachers themselves serve as models for the significance of the intellectual life and its achievements, the impulse to continue learning is often strong enough to overcome the force of contemporary American society as it shapes the ambitions of youth. President Taylor sums up the situation in these words: "The motivation of individual students for further education lies deep within the culture and is strongly conditioned by economic and social factors which determine the patterns of ambitions for Americans as a whole. Among the variety of opportunities for the use of genuine talent, those connected with teaching, scholarship, research and the creative arts are singularly less well rewarded economically, and therefore socially, than the other professions and occupations. The



counterforce lies mainly within the academic profession.

"However, the teaching profession as now constituted does not possess leverage powerful enough to overcome the social and economic forces which move the talented among the young into professions of greater reward, if not greater prestige.

"It is clear that unless we have in our graduate schools a large proportion of the most talented of the younger generation we will not be able to develop the imagination and the intellectual energies of the country to a level sufficient to meet the social and cultural challenges of the future."

There is evidence, although it must be admitted it is impressionistic, that those most likely to be effective research workers in the basic sciences recognize this in themselves fairly early and even during their high school careers, and thus tend to enter directly into the basic sciences or engineering rather than into the professions. This accounts, in part, for the difficulty at times of stimulating pharmacy students to go into graduate work. This again points to the necessity of recognizing these factors in the recruitment for admission to the college of pharmacy in the first place. It emphasizes the necessity for an emphasis on the career concept in pharmacy as opposed to job preparation for the more pedestrian positions in pharmacy. The more it is emphasized to young men and women that pharmacy is a way of life, the greater chance there will be of getting into the field the imaginative ones who will become ultimately good research workers and, indeed, good pharmacists. Instead of recruiting at the graduate level from this path, the tendency often is to select academically good students who are already strongly motivated toward community pharmacy practice and try to convince them that

they should make the necessary sacrifices in order to go into graduate work and ultimately teaching or research. This motivation must be placed in the minds of some, at least, even before they enter college and in others at a much earlier date in their college careers.

Those that go into the graduate program to work toward the Ph.D. are recruited from two sources at the present moment: graduates from undergraduate professional courses and those who have obtained a Master's degree at the same or another institution. It is profitable to take a critical look at the programs in these two recruitment sources to determine the extent to which they can be rendered more basic in outlook. The undergraduate pharmaceutical courses, quite frankly, have been placed to too great an extent on a vocational plane with far too much emphasis on the "practical" approach and far too little concern for basic science in the past. Before the advent of the four-year program, even such basic courses as organic chemistry were often not available in the curriculum, but rather limited elements of organic chemistry were taught along with their application. In the four-year program, the basic sciences were generally present in the curriculum, but many persons teaching at the professional level failed to take full advantage of them. Even today with the advent of the five-year program there are still some who do not take the utmost advantage of the strengthened basic science background and thus elevate the professional courses to the extent that they might.

Returning to the necessity for encouraging those who have ability to prepare for graduate work at an early date, the counselling relative to the elective program of such students becomes extremely important. It would appear to be nothing short of negligent to permit such students to graduate from



colleges of pharmacy today without having had the elements of calculus, for example.

In this period when the high school curricula are undergoing scrutiny and change, entering freshmen at the university should be counselled with greater care in relation to this advanced high school background. Some will enter college, for example, ready mathematically for the calculus courses. Not to arrange to challenge such students fully would be most unfortunate.

Those teaching the undergraduate professional courses in colleges of pharmacy where graduate work is not offered have an especial obligation to encourage better students to go into graduate work. In a recent survey that the speaker made, it was noted that there are several such colleges that have a reputation for having sent quite a number of young men and women into graduate work, whereas others have been negligent in this regard. It should be pointed out that many of these schools have some difficulty in obtaining good teachers, and perhaps one reason for this is that they have failed to add to the stockpile of teachers with the Ph.D. degree.

Schools in this category can encourage young people to go into graduate work and research by many devices. The use of special problems courses is one method that has been very successful. It is of interest that the National Science Foundation provides financial assistance for the promotion of undergraduate research. Teachers could work with undergraduates as extra hands on research projects which, in turn, would permit the teachers to grow professionally at the same time that they are encouraging students.

In conjunction with the process of selecting students to be admitted to graduate study, it is important to make

a better separation between the teaching and the learning process. So much attention is focused on prerequisites, grades, credits, and the like that this kind of academic bookkeeping is all too frequently mistaken for learning. There ought to be better provision in our graduate selection for determining people of real ability and potential in research without paying so much attention to these educational audits.

If you look at persons taking undergraduate work in the colleges of medicine, frequently you will find people working toward Ph.D. degrees in one or more medical science who do not have a background in medicine as such. This is accepted practice; it is believed to be a worthwhile practice and often leads to strengthening of the graduate programs in medicine. While a few such persons without backgrounds in pharmacy are admitted to a few of the graduate programs in the pharmaceutical sciences in colleges of pharmacy, an unfortunate air of suspicion seems to have grown around such practice. Again if we wish to develop really strong graduate programs with emphasis upon basic approaches, the addition of a few well-chosen persons who have substantial undergraduate training in the sciences ancillary to pharmacy should be encouraged.

There are now several colleges of pharmacy that offer graduate work in one or more fields to the Master's level only. Although some of these intermediate programs have been criticized, there are positive values to be received from such programs. In the first place they contribute to the professional growth of the teachers who would otherwise be in an undergraduate school only. Secondly, the presence of the graduate program, no matter how modest, stimulates some undergraduates who might otherwise have no such stimulus to enter graduate work. The criticism of such

programs usually revolves around the mathematics and physical chemistry aspects of the Masters' programs. It occurs to me that colleges, such as Michigan, with strong graduate programs could effect informal or even more formal liaisons with some of the colleges having Masters' programs and strengthen both programs as well as increase the output of Ph.D.'s. It is also possible to bring the teachers of such Masters' programs into the university for short-term post-doctorate educational and research experiences which will strengthen programs back home.

To think of research in pharmacy is to think primarily of research in the applied sciences ancillary to pharmacy such as pharmacy proper, pharmaceutical chemistry, pharmacognosy, and pharmacology. However there is a great deal of evidence that pharmacy, somewhat like medicine, is becoming dependent, more and more, on the application of social sciences as well.

Since pharmacy is a health science, and the economics of better health and medical care is a topic of great importance to many people, it is natural to expect that economics plays an important role in pharmacy too. In this aspect of pharmaceutical research, we look to the area of pharmacy administration and find that the field has made almost no contribution to date. This is a phase of research that is obvious and must be strengthened at the level of fundamental economics if pharmacy is to survive.

There are many other points of impingement of the social sciences on pharmacy which need elucidation. Social scientists who are specializing in the professionalization of the vocations could bring their studies to bear on pharmacy very profitably. Social forces, if they exist, that prevent the pharmacist from making full use of his educational background should be studied

with a view to making the pharmacist still more available professionally.

Studies made by Koos and others have shown that the American drug store is one of the principal places where families take their troubles. They seek the pharmacist to pour out their hearts about many matters other than those related to health. Systematic study of the pharmacist's importance in these regards as well as a curricular approach to strengthening his background in this aspect should be helpful at this juncture.

The field of pharmaceutical education is another area that needs basic research studies made. Much has been said about the pharmacist's changing role in society principally due to the fact that he no longer is a small manufacturer, but to the best of my knowledge no one is making a systematic study of what to do about the matter educationally. Individual courses in the principal course areas have been modernized to bring discussions current technically, but the assembly of information to point up the new role or presumed role of the pharmacist is very largely missing.

New methods of teaching of elementary arithmetic and mathematics which are in vogue currently in high schools and elementary schools could be profitably studied to determine whether or not the attrition in quantitative pharmacy cannot be lessened. There are very few persons teaching so-called pharmaceutical calculations today who have an understanding of the present approach to common arithmetic processes.

We are confronted today with the advent of new drugs placed on the market at an unbelievably rapid rate. The ways of coping with such a deluge of information should be thoroughly studied with a view to the importance

of the new drug to a student once he has graduated. The possibility of the use of closed-circuit television in pharmaceutical instruction, particularly with respect to the clinical application of drugs, could be most profitable if studied properly. The problem of continuing education in pharmacy is one of considerable magnitude and one almost totally unstudied.

Many are the studies in the educational field that are just as basic and need just as much attention as do problems in pharmaceutical chemistry and other science areas.

In closing, I apologize for being redundant in speaking about the necessity of keeping pharmaceutical research fundamental in an institution like the University of Michigan. I believe that this is so important that I am apt to speak to the point at the drop of the proverbial hat. Perhaps I am like the physician at the Quaker funeral who, when no one offered a word for the deceased, said: "If no one wishes to say anything about the deceased, I would like to say a few words about socialized medicine!"

## THE IMPLEMENTATION OF THE FIVE-YEAR PROFESSIONAL CURRICULUM

Since the five-year pharmacy curriculum was recently put into effect, it should prove to be of great interest to pharmaceutical educators to compare the different ways in which this curriculum has been implemented in the various colleges of pharmacy.

It appears that some educators initially, at least, were opposed to an increase of the curriculum of one year, and this author has failed to recognize really cogent arguments for its introduction. It may not appear very reasonable to some that pharmacists should need a much longer period of study than other professional groups such as engineers, architects, and even teachers in high school; the engineering profession is planning a shortening of its curriculum. It is likewise my impression that certain state boards of pharmacy are opposed to the five-year plan.

Jenkins and Christian (1) have expressed concern about this program for reasons of graduate education. It seems reasonably obvious that the graduate enrollment will decrease as the students who have studied for five years for

their B.S. degrees graduate, because the financial return of graduate study does not seem to be commensurate with the time needed for its completion. It is hoped, however, that their gloomy expectation in this matter will not materialize.

Since I have seen very little logical argumentation for the five-year program, I have chosen arbitrarily three college of pharmacy bulletins for study, and the curricula have been tabulated by semesters in Table I. Colleges "A" and "C" are located in the Southwest, and "B" represents a well-known college in the Midwest.

Table I reveals a pronounced heterogeneity. The first fact that strikes the eye is that the total number of credit hours required for graduation varies from 156 to 170 based on a sixteen-week semester. This variance represents, to this author, a definite weakness, since it may be difficult to convince a student that he should carry an

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\*Assistant Professor of Pharmacognosy, College of Pharmacy, The University of Texas

average load of seventeen hours per semester in one school, whereas he might get by on a pedagogically sounder load of fifteen hours in another college.

If we compare the detailed curricula by academic years, it will be noted that the only identical courses required during the first semester are three hours of English and three of algebra. This variance is embarrassing, and can hardly be defended by local conditions or entrance requirements.

A critical evaluation of the core curriculum reveals that two colleges require twelve hours of English, whereas the third deems seven hours sufficient. The two former schools require six hours of history; the third has no requirement for learning this subject. As to economics, the range is from three to six taught in the first and second years.

It should be noted that one college does not teach general organic chemistry and that the requirement for government varies from three to six hours taught in two schools in the second year, in one school during the fourth year. Some of these differences may be due to local, legislative, or other requirements.

There seems to be complete unanimity with regard to physics, of which all colleges under study require eight hours.

The course credit requirement for general pharmacy varies from six to twelve hours, whereas the modern science of physical pharmacy is required in only one college, which lists three credit hours.

Special attention should be directed to the fact that one college does not teach inorganic pharmaceutical chemistry, thus weakening the position and justification of this subject in the curriculum. One of the other listed schools requires thirteen hours of organic pharmaceutical chemistry taught during the third and fourth year as against three and six hours in the other colleges.

The credit required for pharmacognosy varies from three to eight hours, and this subject is scheduled in the fourth and third years, respectively. The emphasis put on prescription practice varies from seven to eleven hours, but it should be noted that the college listing eleven hours apparently has made this course optional, or is alternating it with manufacturing pharmacy.

Two colleges teach pharmacology in the fifth year, eight and six hours respectively. The third lists six hours of the same in the fourth year.

To top it all off, the varying importance of elective courses should be noted. One college permits thirty hours of electives, or about 20 per cent of the curriculum, to be chosen, presumably at the discretion of the students, whereas the maximum permissible hours in another school are thirteen. One might, also, justifiably pose the question of what value 128 *class* hours of "convocation" is, or what purpose it serves, in one school only.

It appears, therefore, to this author, that the necessity for a five-year program is questionable based on the above considerations. There seems to be a considerable confusion regarding the purpose of the additional year of study. This is borne out clearly if we consider the varying stress put on groups of courses; e.g., the number of credit hours for required courses of the business type (economics, accounting, administration) ranges from nine to eighteen; history from three to nine hours. The wide variation within pharmacy core courses has been emphasized above. It may, in places, appear as though the various schools prepare the student for different professions.

Another point which should be considered from an educational point of view is the apparent impasse which will be encountered if students transfer from



one college to another. It was not stressed above, but is readily apparent from Table I, that the various courses are taught at the most different times, with the most varying prerequisites and amounts of laboratory work.

It should be pointed out that this author is not an advocate of conformity, for at experimental stages smaller differences of curricula may be beneficial. However, when the opinions among three randomly chosen schools differ to such an extent as outlined above (it is possible that the remaining some seventy colleges, not studied, may reveal greater divergences), it appears that the disunity of approach might injure rather than benefit the prestige of the profession of pharmacy. The accrediting committee of the ACPE might do well in advising colleges whose curricula appear to be strongly unbalanced.

Pharmaceutical educators might do well in studying the following recommendations of the Science Section of the International Pharmaceutical Federation with respect to modern pharmacy education to see if we measure up to international standards. This recommendation was approved by the Federation meeting in Zürich in 1960.\* (2)

1. The scientific training of chemists (pharmacists) in pharmacodynamics including the necessary elements of physiology and anatomy should be perfected so that they may act as *specialized advisors* to doctors in pharmacotherapeutical matters.
2. The training of chemists in *medical, biological and bromatological* analyses should also be perfected so

that they are capable of supplying doctors with correct and indisputable results.

3. The training in physics, *physical chemistry* and *colloidal chemistry* should be considerably extended so as to fit chemists for the irreproachable preparation, correct dosage and *analysis of all pharmaceutical forms*, in so far as the technical means are available to them.
4. The technological training should be developed to the point of giving chemists, at the end of their studies, not only theoretical training but also sufficient practical skill for them to be able to exercise their profession *equally* well as retail chemist, industrial chemist or hospital chemist, etc.
5. The knowledge of statistical mathematics should be sufficient for chemists to be able to work out a rational plan of work and interpret the results obtained.
6. Apart from the pharmaceutical sciences, proper training should include *some* knowledge in the economic and social fields.

It appears that the United States pharmaceutical education has a long way to go in order to satisfy adequately items 1-5, above.

#### References

- (1) Jenkins, G. L., and Christian, J. E., *Am. J. Pharm. Educ.*, **23**, 367 (1959).
- (2) Anon., *Norsk Farm. Tidsskr.*, **68**, 164 (1960).

\*Italics by this author.

**TABLE I**  
**Curricula of Three Selected Colleges of Pharmacy**

FIRST YEAR		
First Semester		
COLLEGE A		
General Zoology .....	1	
General Biology .....	3	
Freshman English .....	3	
History of the United States .....	3	
College Algebra .....	3	
Physical Education Activities .....	1	
	<hr/>	14
COLLEGE B		
General Chemistry .....	4	
Algebra .....	3	
English Composition .....	3	
Sociology .....	3	
Military Training or P.E. ....	2	
Developmental Reading .....	$\frac{2}{3}$	
Pharmacy Orientation .....	1	
	<hr/>	16 $\frac{2}{3}$
COLLEGE C		
Biology or Zoology .....	3	
General Chemistry .....	4	
Freshman English .....	3	
Economic Principles .....	3	
Algebra .....	3	
	<hr/>	16
Second Semester		
COLLEGE A		
General Botany Laboratory .....	1	
General Biology .....	3	
Freshman English .....	3	
History of the United States .....	3	
Plane Trigonometry .....	3	
Principles of Economics .....	3	
Physical Education Activities .....	1	
	<hr/>	17
COLLEGE B		
General Chemistry with Qualitative Analysis .....	4	
Trigonometry .....	3	
Speech .....	3	
Psychology .....	3	
Military Training or P.E. ....	2	
Reading Comprehension .....	1	
	<hr/>	16
COLLEGE C		
Biology or Botany .....	3	
General Chemistry .....	4	
Freshman English .....	3	
Economic Problems .....	3	
Trigonometry .....	3	
	<hr/>	16

## SECOND YEAR

### First Semester

Introductory General Chem. ....	4	Convocation (1) .....	0
Western World Literature .....	3	Introductory Pharmacy .....	2
Introductory General Physics .....	4	Introductory Organic Chem. ....	4
American Government .....	4	History of U.S. ....	3
National, State & Local .....	3	General Physics .....	4
	<hr/>	Speech or Soph. Eng. ....	3
	14	Physical Education (1) .....	0
			<hr/>
			16

### Second Semester

Introductory General Chem. ....	4	Convocation (1) .....	0
Western World Literature .....	3	Pharm. Calculations .....	2
Introductory General Physics .....	4	General Pharmacy .....	2
American Government .....	4	Elementary Organic Chem. ....	4
National, State & Local .....	3	Science Writing or Soph. Eng. ....	3
Core Curriculum Electives .....	3	History of U.S. ....	3
	<hr/>	General Physics .....	4
	17	Physical Education .....	0
			<hr/>
			18

THIRD YEAR

First Semester	
Pharmaceutical Mathematics .....	2
Beginning Organic Pharm. Chem. ....	3
Drug Assay .....	4
Operative Pharmacy .....	4
Core Curriculum Electives .....	3
<hr/>	
16	
General Pharmacy .....	3
Quantitative Analysis .....	4
Applied Pharmacognosy .....	3
Economics .....	3
Electives .....	3
<hr/>	
16	
Convocation (1) .....	0
Pharmacognosy .....	4
Pharm. Analysis .....	4
Inorganic Pharm. Chemistry .....	4
General Bacteriology .....	3
Human Physiology .....	3
<hr/>	
18	

Second Semester	
Physiological Chemistry .....	2
Physical Pharmacy .....	3
Inorganic Pharm. Chemistry .....	3
Beginning Organic Pharm. Chem. ....	4
Core Curriculum Electives .....	3
<hr/>	
15	
General Pharmacy .....	3
Bacteriology .....	4
English Composition .....	3
Physiological Chemistry .....	3
Electives .....	3
<hr/>	
16	
Convocation (1) .....	0
Pharmacognosy .....	4
Accounting .....	3
Organic Pharm. Chemistry .....	4
Bacteriology .....	3
Advanced Human Physiology .....	3
<hr/>	
17	

# FOURTH YEAR

## First Semester

Elementary Bacteriology .....	4		
Organic Pharm. Chemistry .....	3		
Advanced Drug Assay .....	3		
Pharmacognosy .....	3		
Physiology .....	3		
	<hr/>		
	16		
Physiology .....	3		
Organic Medicinal Products .....	3		
Pharmacy Administration .....	4		
Prescription Practice or Manufacturing .....	4		
Electives .....	3		
	<hr/>		
	17		
Convocation (I) .....			0
Drug Marketing .....			3
Organic Pharm. Chemistry .....			2
Jurisprudence .....			3
General Pharmacy II .....			4
Pharmacology .....			3
Government .....			3
			<hr/>
			18

## Second Semester

Organic Pharm. Chemistry .....	3		
Pharmacognosy .....	3		
Drugstore Accounting .....	3		
Advanced Pharmacy .....	4		
Physiology .....	3		
	<hr/>		
	16		
Physiology .....	3		
Pharmacy Administration .....	3		
Applied Pharmacognosy .....	3		
Prescription Practice or Manufacturing .....	4		
Electives .....	3		
	<hr/>		
	16		
Convocation (I) .....			0
General Pharmacy III .....			4
Biopharmaceutical Chemistry .....			4
Prescription Practice .....			3
Prescription Compounding .....			1
Pharmacology .....			3
Government .....			1
			<hr/>
			18



# FIFTH YEAR

## First Semester

Pharmacy Law .....	2	Convocation (1) .....	0
Drugstore Business Methods .....	3	Prescription Practice .....	3
Prescription Practice .....	4	Prescription Compounding .....	1
Pharmacology .....	4	Public Health .....	3
Pharmacy Electives .....	3	Modern Ethical Preparations .....	3
	<hr/>	Approved Electives .....	8
	16		<hr/>
			18

## Second Semester

Interprofessional Relations .....	1	Convocation (1) .....	0
History and Ethics .....	2	History of Pharmacy .....	3
Public Health .....	2	Basic Manufacturing Pharm. ....	2
Prescription Practice .....	3	Retail Pharmacy Management .....	3
Pharmacology .....	4	Inspection Trip (1 Week) .....	0
Pharmacy Electives .....	3	Teaching First Aid .....	2
	<hr/>	Approved Electives .....	5
	15		<hr/>
			15

TOTAL CREDIT HOURS  
REQUIRED .....

163½

156

170

## REPORT OF THE DELEGATE TO THE AMERICAN COUNCIL ON EDUCATION

The forty-third annual meeting of the American Council on Education was held at the Palmer House, Chicago, Illinois, on October 6-7, 1960. It was attended by a few over 700 persons representing eighty-two organizational members of the Council and 338 institutional members.

The general theme of the meeting was "Integrity of Educational Purpose." To quote from the program:

As institutions of higher learning become more deeply involved in economic, social, and political, as well as cultural affairs, they are subject to powerful forces that may distort their essential functions.

Under these circumstances, it becomes important to restate the basic purposes of higher education and to assess the impacts of the more obvious forces, in order to determine the extent to which they are harmful or beneficial. It is also important to consider means of avoiding the harm and increasing the benefits.

From a long list of influences which affect the purposes of higher education, six were selected for discussion by study groups. Because your delegate could not give close attention to six different

groups, the following report is abstracted from the reports of the six recorders given at the general meeting.

### **Appropriate Criteria for Evaluating Costs in Higher Education**

Many types of data—especially cost analysis with respect to units of teaching load, cost of production, etc., have been developed and utilized. These data have been developed for many uses both internal and external. Care should be taken in using them for other than the purpose for which they were intended because factors and figures which a given institution may find valid for its internal purposes may not be present and valid in a second institution. Comparisons based on different or inapplicable situations lead to erroneous and sometimes damaging conclusions.

It was suggested that the concepts of analysis might well move from the credit hour or class hour base to an "environment for learning" basis such as was developed and utilized in the "California and Western Conference Cost and Statistical Study."

The data provided by business and financial offices of institutions can not measure the all important matter of quality in the institution, the department, the instruction or the product. Few criteria are available with which to define these and much more research is needed in this area of measurement.

### **The Academic and Financial Impacts of Sponsored Research on Universities**

The general opinion on this topic was that much benefit had accrued to institutions through sponsored research projects. Where indirect costs had been restricted some channeling of academic budgets into administrative costs were necessary. If sponsored research is accepted to the disadvantage of teaching and independent research, it is detrimental to the purposes of the institution. A well-defined policy regarding the extent of sponsored research which the institution can and should accept should be worked out by discussions between administration and departments doing the research.

### **The Impact on Colleges and Universities of World Responsibilities**

There was general agreement that American universities and colleges are now confronted with global responsibilities which are a reflection and a facet of the enlarged international commitments of the USA.

In order to preserve their integrity of educational purpose, institutions of higher learning must pursue their proper role of increasing and diffusing knowledge. In this activity, they will make their most effective contribution to the larger purposes of our nation.

The impact of global responsibilities has been, and will probably continue to be, uneven as between different types of institutions. Undergraduate colleges of arts and sciences must be mainly concerned with instilling in all their students world awareness and cultural empathy. Universities have the further duty of offering special preparation for careers in international services and of helping with the development of sister institutions in other lands.

The situation does not impose any new responsibilities on educational institutions but only an obligation to re-

view and redefine their standing responsibilities in the context of a changing world. This obligation is only a continuance of their standing duty to strike a balance between their own distinctive task and their responsibility to society.

If American institutions are to be as effective as possible in promoting worldwide educational developments, their resources must be carefully husbanded and applied in accordance with systematically determined priorities. It is necessary to balance the needs of the country to be served with the abilities to help and purposes of the American institution and the international policy of the United States.

### **The Proper Relationships between State Governments and State-supported Higher Institutions**

A fundamental aspect of the relationship between state governments and state-supported institutions is that management responsibility should rest primarily with the institutions legally having this responsibility and not be scattered among university officers and numerous state officials. If educational integrity is to be maintained, it will be with the help of governing boards whose members have a high sense of integrity regarding their responsibility. The board members should assume a major share of the responsibility for communicating institutional objectives and policies to state officials and the general public.

Communication should stress the contributions of higher education to society and the notion that responsible freedom has been our best method for progress. It should stress that creative research and teaching require freedom; that this need has been long recognized in American traditions of education; and that a distinction ought to be made, perhaps, between sovereign activities of government which may require exten-

sive control (as National defense) and activities rendered as a service to the people (as education) where special treatment may be most appropriate because of the nature of the services.

Coordination of the activities of multiple state-supported institutions and among these and privately supported institutions is not only desirable but also necessary. Coordination may be voluntary or it may be directed by statutory boards. Successful coordination has been achieved by both methods. Where coordinating boards are deemed to be most appropriate, the boards should be professional in nature, confined to statewide policy questions, and should provide continuous research and long-range planning.

#### **The Influence of Environment on Urban Institutions**

Urban institutions are of the widest variety as to size and character of student bodies and scope of educational programs. Activities appropriate to one may well be inappropriate to another. Each must know its goals; each must establish its purposes. Many of these purposes will rise above the specialized needs of the local community. Having decided what its role should be, a college or university can interpret that role to its community and in turn, as requests come for services, it can judge whether such services are appropriate for it to undertake.

The needs of our communities for in-service education, for research, for continuing education for the adult population, are overwhelming. Appropriate requests far outrun resources of faculty and funds, and often of facilities. The hope must be that increased understanding will bring increased general support.

The physical needs of growing urban universities located in slum neighborhoods have been aided by the ability to obtain federal funds for land clearance

and community rehabilitation. Several states have created agencies with powers of eminent domain through which colleges and universities may secure needed land. These are helpful in areas where they apply but many institutions need help which do not need the kind of aid available through such agencies. The attention of the community must somehow be directed to the needs of the institution in its midst.

#### **The Appropriate Role of Accreditation in a Period of Rapid Social Change**

Accrediting agencies were credited with being the best means now available of evaluating institutions and enforcing minimum standards. It was suggested that there should be wider recognition by institutions and agencies that accreditation rests on the same philosophical principles as does our form of civil government (e.g., it rests on the principles of decentralized responsibility, balance of power, and consent of the governed). Further, accreditation should be concerned not only with upholding minimum academic standards but also with placing increasing emphasis on superior education. It was also pointed out that there is an essential difference between the accreditation of an institution and the evaluation of an individual program within the institution.

On the practical side, there was concern over: (1) the amount of subjective judgment in present practices of evaluation; (2) the anarchical situation in the area of graduate schools of arts and sciences and the need for currently maintained evaluations of these programs by institution and by subject—a need felt by prospective graduate students, their college advisers, as well as the United States and foreign governments; (3) the need for differing techniques for enforcing minimum standards and for stimulating superior education;

(4) the need for the National Commission on Accrediting and the regional accrediting agencies cooperatively to find and develop improved methods of evaluating quality and better ways of judging the end product of the educational program.

There was also general agreement that evaluation should be based on the statement of objectives set forth by an institution itself. It was felt that the

way in which these objectives were determined, the faculty acceptance of them, their internal consistency, their appropriateness and worthiness, and their operational significance and effectiveness should be subject to review by the accrediting agency, inasmuch as these are elements significant to the determination of institutional excellence.

George L. Webster, Delegate



## REPORT OF THE REPRESENTATIVES TO THE NATIONAL DRUG TRADE CONFERENCE

The National Drug Trade Conference was held at the Hotel Washington in Washington, D.C., on December 16, 1960. Representing the American Association of Colleges of Pharmacy were Lloyd M. Parks and Joseph B. Sprowls. E. E. Leuallen had expected to be present but was unable to attend because of illness.

The Conference program took the form of an evaluation session which began with a brief statement by a representative of each group indicating his appraisal of the Conference and its potential objectives. The statement from the AACP was presented by Dean Sprowls, although it had been approved by the other two delegates. (See following.) The Conference members were then divided into two discussion groups for the purpose of suggesting immediate, short-range, and long-range plans of action which might be appropriate for the Conference. These were then reported and discussed by the entire assemblage. A list of the suggested activities is appended. (See addendum.)

The Conference voted to endorse the provision of the Karsten amendment to the Federal Narcotics Act and authorized the Committee on Uniform State Legislation to prepare a conforming amendment for the Uniform State Narcotics Act. It also endorsed the provisions of the Federal Hazardous Substances Act and recommended the enactment of supporting legislation at the state level.

Dr. Fischelis was recognized for the completion of his second term as president of the Conference. Mr. James Allen was elected as president for the next year, Dr. Austin Smith as vice president, and Mr. Ray C. Schlotterer as secretary-treasurer. Dean Sprowls was elected a member of the Executive Committee.

E. E. Leuallen, Lloyd M. Parks,  
and Joseph B. Sprowls,  
Representatives

### **Statement to the NDTC by**

**Dr. Joseph B. Sprowls  
Representing the  
American Association of  
Colleges of Pharmacy**

In preparing this brief statement, I have re-read the address entitled "Behind the NDTC Curtain" which was delivered before this Conference by Secretary Schlotterer at the 1954 meeting. In his excellent address, Mr. Schlotterer indicated that the Council was formed to enable delegates from groups representing divergent interests to meet and discuss problems of mutual interest without any one group being bound by actions of the whole. He also reviewed the constructive movements which have developed from the Conference in spite of, or perhaps as a result of, its method of procedure and indicated the nature of pressures which were then being brought to change its nature.

Since the first meeting of the Conference in 1913, the general construction of the conference has scarcely varied, because it has always included in its membership all organizations which represent substantial segments of pharmacy. On the other hand, objectives of some member organizations have changed considerably. For example, it would seem that there is a great deal less divergence between the general objectives of the PMA and the A.Ph.A. in our time than would have been the case in 1913. Conversely, the objectives of some member organizations have become increasingly divergent as the years have passed. Increasing divergence of objectives seems to have brought about whatever pressures now exist for reorganization of the Conference.

The challenge remains as it was stated by Mr. Schlotterer in 1954: either to preserve an open forum in which divergent views may be expressed without thought of enforcing action upon any group; or to consider methods by which the conference might be converted to a stronger influence among pharmaceutical organizations. The latter choice would unquestionably place the conference in conflict with some of those groups which are represented here.

Although I cannot speak with authority for the membership of the AACP, it is my opinion that the Conference approach is all that we can hope to achieve. The American Pharmaceutical Association, through its House of Delegates, is in a position to represent in a forceful manner the broad interests of pharmacy. Other constituent groups are prepared to represent the selective interests for which they were constituted. What remains, then, is that which we have—a forum in which all opinions may be expressed in hope that some measure of unanimity of purpose may

be developed and common objectives pursued to a successful fruition. Though groups are at odds from time to time with respect to specific matters, continued communication is essential. Perhaps like the United Nations, the NDTC remains a light of hope in the face of forces which threaten to split asunder member groups.

It would be improper to charge any member with unduly motivated selfish interests. However, if any group should insist upon continually placing self-interest first in all negotiations, they, like a contrary delegation at the United Nations, will continue to prevent a measure of unity and harmony which might otherwise be achieved. Past experience has shown that as we become more vitally concerned with the public interest, we draw more closely together and find a more common objective. An example of this can be found in the aftermath of the adoption of national food and drug legislation and uniform state food and drug laws. Surely there is much greater unity of action and purpose at all levels than was true before such laws were adopted. If any group should for a long time continue to stand alone on issues of major importance, the Conference would seem to be justified in deciding that there is no interest in common. In such a case, a request for withdrawal would be in order.

One procedural change is suggested. This has to do with issues which are discussed but upon which no general agreement is reached by the Conference. Would it not be appropriate to issue a statement to member groups indicating the general nature of the subject and the major points at issue? This would permit the delegates to present a reliable summation to the organization which they represent. At the present time reports cover only areas in which there has been rather complete agreement.

The American Association of Colleges of Pharmacy hopes it can offer continued support and leadership in the deliberations of the NDTC. The AACP has no commercial interest to protect and we have comparatively little to fear from economic or legal readjustments. Let me neither pretend, however, that the group I represent is without prejudice nor suggest that it is without purpose. Colleges of pharmacy are interested in all movements which improve the pharmaceutical services of the nation through the preservation of that which we regard as essential, the maintenance of proper legislative controls at all levels of drug manufacture and distribution and the development of a qualified and adequately protected corps of professional personnel. Our destiny is intertwined to some degree with each of yours and each of the organizations represented here should be willing to subscribe to the broad purposes which have just been expressed.

In consideration of the foregoing, the representatives of the American Association of Colleges of Pharmacy hereby propose the following resolution:

*"Whereas, the National Drug Trade Conference has successfully accomplished its intended objective of being a forum in which representative groups can meet 'to consider matters of national and general interest in Pharmacy and the Drug Trade' and, Whereas, the representative groups are of such a nature that they cannot be expected to be bound by any resolutions adopted at a meeting, therefore,*

*Be it resolved, that no attempt shall be made to alter either the method of procedure or the nature of the representation at this time."*

#### **Addendum Objectives for National Drug Trade Conference**

1. Immediate
  - (a) Continuation of the Conference
  - (b) Changing its operation from a unanimous rule to a majority rule—an action rather than a discussion group
  - (c) Consideration of changing the name of the Conference
  - (d) Supplying the press with a summary of the pro and con on all leading topics discussed by the Conference
2. Short-range
  - (a) Endeavoring to change the unfavorable image of the industry
  - (b) Acting as a clearing house for all legislation affecting the profession-industry
  - (c) Keeping members informed and cutting duplication to a minimum on the pharmaceutical manpower problem
  - (d) Continuing the workshop type of meeting
3. Long-range
  - (a) Emphasizing a favorable image for the profession-industry
  - (b) Developing a unified public relations program
  - (c) Continuing a self-education program with the membership of the Conference
  - (d) Acting as a clearing house for proposed legislation affecting the industry-profession
  - (e) Acting as a clearing house for pharmacy manpower programs
  - (f) Making medical care studies
  - (g) Continuing so-called "brainstorming" sessions

REPORT OF THE DELEGATE  
TO THE AMERICAN ASSOCIATION  
FOR THE ADVANCEMENT OF SCIENCE

The 127th meeting of the American Association for the Advancement of Science was held in New York City, December 26 through December 31, 1960.

The program for Section Np (pharmacy) consisted of eight sessions co-sponsored by the American Pharmaceutical Association, the American Association of Colleges of Pharmacy, the American Society of Hospital Pharmacists, the American College of Apothecaries, the National Association of Boards of Pharmacy, and, in part, by the Committee on Cosmetics of the American Medical Association. The hospital pharmacy sessions were arranged by George F. Archambault, United States Public Health Service, and Joseph A. Oddis, American Society of Hospital Pharmacists; the sessions for contributed papers in pharmacy, pharmacology, and chemistry were arranged by John E. Christian, Purdue University; the symposium on "The Scientist's Contribution to the Safe Use of Cosmetics" was arranged by Raymond R. Suskind, University of Cincinnati. Colleges of the AACP represented by contributors of papers were Brooklyn College of Pharmacy, Columbia, Connecticut, Duquesne, Florida, Northeast Louisiana State, Maryland, Michigan, Purdue, Rutgers, Temple, and Texas.

It was not possible to attend all pharmacy section meetings because of conflicts in time with meetings of the Council of the Association. The Council is

the governing group responsible for the affairs of the AAAS. The AACP as an affiliate is entitled to representation on the Council.

The two Council meetings covered an agenda of twenty-three items, including changes in the Constitution and reports from officers and several Committees. As your representative, the points of particular interest included the following: (1) while the weekly publication *Science* serves to provide intercommunication among scientists on a technical level, a new publication will appear quarterly in 1961 which, in addition to carrying Association news, is expected to provide intercommunication among scientists and laymen members of the AAAS; (2) a new staff member has been employed to work on improving the public's understanding of science; (3) the 280 affiliated groups should encourage membership of their constituents in the AAAS, since no financial contribution is made by the affiliate; (4) Joseph A. Oddis was elected vice president of the pharmacy section and Lee H. MacDonald, The Upjohn Company, was elected to serve as committeeman-at-large; John E. Christian continues as secretary; (5) the 1961 meeting between Christmas and New Year's is to be held in Denver.

Continued support of the AAAS and participation in its affairs by representatives of the member colleges of the AACP appear desirable.

Andrew J. Bartilucci

# Executive Committee

## MINUTES OF ANNUAL MEETING

Harvest House, Boulder, Colorado

July 1-2, 1960

*(Editor's Note: Publication of these minutes has been unavoidably delayed. See this Journal Volume 25, No. 1, page 141 for the Minutes of the 1960 Interim Meeting of the Executive Committee, and Volume 24, No. 4, page 530 for the Minutes of Special Meetings of the Executive Committee held in Washington, D.C., August 15 and 17, 1960.)*

Chairman Hewitt called the meeting to order at 9:00 A.M., July 1.

Present: Chairman H. G. Hewitt; Past President L. C. Zopf; President C. W. Bliven; Vice President H. M. Burlage; Members L. W. Busse, G. P. Hager, E. A. Swinyard, K. L. Waters; Secretary-Treasurer G. L. Webster; Editor M. R. Gibson.

### 1. Approval of Minutes of Previous Meeting.

On motion of Webster-Swinyard the minutes of the interim meeting held in Chicago, Illinois, November 9-10, 1959 were approved.

### 2. Additions.

Several subjects were proposed and added to the agenda.

### 3. Appointment of Committees.

Chairman Hewitt announced the Committee on Credentials to be: L. C. Zopf, chairman, and E. A. Swinyard; the Committee on Applications for New Members to be: G. L. Webster, chairman, and L. W. Busse.

### 4. Communications.

a. From Mrs. Zelpha C. Franklin, health careers administrator, National Health Council, 1790 Broadway, New York 19, New York, outlining the composition and objectives of the National Health Council in answer to a letter of inquiry sent by the Secretary. The participation of the American Pharmaceutical Association in the work of the NHC was described.

b. Correspondence among deans of several member colleges in District 4, AACP-NABP regarding a proposed survey to be sponsored by the Committee on Institutional Cooperation of the Council of Ten and the University of Chicago. It was pointed out that although this survey was necessarily restricted to the seven colleges of pharmacy which were constituent members of the sponsoring council, the resulting recommendations would be shared, through publication, with all member colleges and could be adopted in other regions or districts. A grant of funds has been made to conduct the survey



by the Council of Ten and the University of Chicago and a preliminary set of objectives has been agreed upon.

c. From the Secretary of the English Speaking Union asking the help of some AACP members to act as host to a visiting professor of pharmacy, Dr. James C. Parkinson of the Technical Institute of Brighton. Chairman Hewitt and President Bliven volunteered to make suitable arrangements.

d. From the American Council on Education asking for a revised list of delegates.

e. From the National Science Teachers Association thanking this Association for its help in providing an exhibit and manning it at their convention in Kansas City.

f. From the National Pharmaceutical Council thanking the Association and its Executive Committee for cooperation in the Pharmacy Education-Industry Forum held last August at Princeton, New Jersey.

g. From Arthur S. Osborne, chief, International Organization Relations Branch, Division of International Health, Department of Health Education and Welfare, calling attention to a list of non-proprietary names for pharmaceuticals suggested for adoption by the World Health Organization and asking for suggestions and comments on this list. The Executive Committee referred this matter to Dean Hager.

h. From William L. Ford, director of research, National Wholesale Druggists Association, suggesting plans which they are considering for including information on pharmaceutical education in a proposed publication, *Drug Industry Review*. This matter was referred to the incoming Secretary-Treasurer.

i. From Eli Lilly and Company indicating the dates of the third Lilly Industrial Seminar have been scheduled for August 27-September 1, 1961.

## **5. Consideration of Addresses and Report of Officers.**

President Bliven and Vice President Burlage each presented copies of his prepared address for the information of the Executive Committee.

The report of the Chairman of the Executive Committee and of the Secretary-Treasurer were presented, discussed and received approval of the Committee.

## **6. Report of the Editor of the American Journal of Pharmaceutical Education.**

The Editor's report was read and discussed. It is to be published in full in the proceedings number of the *Journal*.

## **7. Report on the Joint Meeting of the Officers of the AACP with the American Council on Pharmaceutical Education.**

The report of this meeting formed a part of the report of the Secretary-Treasurer. The topics discussed were:

- (a) the trimester plans as announced by the University of Pittsburgh and the New England College of Pharmacy;
- (b) the eligibility of students to graduate under a four-year-after-high school curriculum should their normal progress be interrupted by circumstances beyond their control; and (c) the eligibility of holders of the professional Doctor of Pharmacy degree to be considered as suitably qualified for major positions on a college of pharmacy faculty.

## **8. Report of the Annual Meeting of the Members and of the Board of Directors of the American Foundation for Pharmaceutical Education.**

Chairman Hewitt presented a summary of these meetings. He reported the continuing concern of the Foundation members and Directors in pharmaceutical education. Funds were appropriated for the *American Journal of Pharmaceutical Education*, the Teachers' Seminar on Pharmaceutical Educa-

tion, undergraduate scholarships, graduate fellowships, and the American Council on Pharmaceutical Education. The Board of Directors voted approval of the transfer of the remaining funds, which had been appropriated to the AACP for use of its recruitment aids program under the direction of the Committee on Recruitment Aids, to the American Pharmaceutical Association which has assumed the responsibility of continuing a program of recruiting for pharmacy.

**9. Report of AACP Representatives to District Meetings.**

Oral reports from members of the Executive Committee who had attended these meetings indicated that much constructive discussion resulted from these meetings. The programs indicate the major concerns of the members in the various districts. A schedule for meetings during the next year was assembled from various reports.

District No. 1 meets October 12-13 (1960) at Hartford, Conn.

District No. 2 meets October 6-7-8 (1960) at Wilmington, Del.

District No. 3 meets October 9-10-11 (1960) at Columbia, S.C.

District No. 4 meet February 12-13-14 (1961) at Purdue University.

District No. 5 meets October 2-3 (1960) at Sioux Falls, S.D.

District No. 6 meets March 13-14 (1961) at Houston, Texas.

District No. 7 and 8 meet November 6-7-8 (1960) at Las Vegas, Nevada.

**10. Plans for Teachers' Seminar for 1961.**

The Chairman reviewed his plan for calling for invitations to be chosen as host to the 1961 Teachers' Seminar in Pharmacy in the early fall and to receive these proposals in time for selection of the host school by the interim meeting.

**11. Time and Place of the Interim Meeting of the Executive Committee.**

After discussion it was voted to have the interim meeting of the Executive Committee in Chicago on November 11-12, 1960, at the Bismarck Hotel.

**12. Size of the Executive Committee.**

A report on the length of term and number of members on the Executive Committee was reviewed. No action to recommend a change in the present constitutional provisions was taken.

**13. Study of the Capacity of the Existing Undergraduate and Graduate Facilities.**

This was a subject of major consideration in the address of President Bliven and a recommendation of action on this matter is to come before the members from that source.

**14. A Booklet on Pharmacy for Graduating Medical Students.**

Editor Gibson presented a request from a correspondent pharmacist asking if a booklet was available which could be used to help instruct medical students as to the functions of pharmacy. The potential value of this type of information for this purpose was recognized. It was suggested that the editor seek a contributed article on this subject from a faculty member who had prior experience in instructing medical students in pharmacy. Professor Seymour Blaug of the State University of Iowa was mentioned as qualified to prepare such an article.

**15. Career Survey in a Future Issue of Changing Times.**

Chairman Hewitt reported that he had been informed that a future issue of *Changing Times* would contain an article on careers in pharmacy. Past experience with the reader response to briefer references to our publication *Shall I Study Pharmacy* indicates that an

article of this sort should have an important impact on parents and result in many inquiries for more detailed information.

**16. The Trimester Plan in Pharmaceutical Education.**

References to this matter are made in the address of President Bliven and in the report of the Secretary-Treasurer.

**17. One Hundred Problems in Environmental Health.**

Chairman Hewitt presented a booklet with this title prepared by a group of experts with the financial support of the National Institutes of Health. He posed for discussion the possibility of arranging for the collection and publication of a companion booklet of *One Hundred Problems in Pharmacy*. The possible impact of such a compilation on pharmaceutical research in member colleges was discussed. Chairman Hewitt was authorized to discuss this matter with Dr. Albritton of NIH during his presence in Washington at the annual meeting of the A.Ph.A.

**18. Consideration of H.R. 357 (Continuation Studies).**

This is a bill to provide funds for extension work. Other bills, namely, H.R. 6208, H.R. 7289, H.R. 7381, and H.R. 8101 are concerned with similar matters of continuing education. Hearings have been held before the Subcommittee on Special Education of the Committee on Education and Labor, House of Representatives. Deans Bliven and Waters gave testimony urging the passage of H.R. 357. They informed the subcommittee that the AACP and the profession of pharmacy were interested in this bill because of the usefulness of funds in promoting knowledge about public health. A resolution is to be introduced urging delegates to support this bill.

**19. Legislative Bills H.R. 6906 (Rep. Fogarty) and S. 2170 (Sen. Neuberger).**

Deans of member colleges were asked, in a communication from Chairman Hewitt, to support both of these bills. A substantial response was reported. President Bliven and Chairman Hewitt attended hearings on H.R. 6906. No hearings on S. 2170 have been held.

**20. Legislative Bills H.R. 10255, H.R. 10341, and H.R. 11561.**

Dean Hager called attention to these bills which provide scholarship aid (H.R. 10255 and H.R. 11561) to students of medicine, osteopathy, and dentistry and grants in aid to universities, hospitals, laboratories, and other public or non-profit institutions to strengthen programs of research and research training in sciences related to health (H.R. 1034). Students of pharmacy are not mentioned in the first two bills. Attention was called to this and the suggestion made that close attention be given to future bills of this nature so that the needs of pharmaceutical education may be considered in these bills by amendment and in future bills of this general nature. H.R. 10341 is worded in such a way that colleges of pharmacy could be eligible to receive funds. Dean Hager presented summaries of the provisions of each bill.

**21. Resolution Adopted in the Meeting of the National Drug Trade Conference.**

There was a discussion of the letters from the members of the AACP delegation to the National Drug Trade Conference in which the delegates explained their action on a resolution which was presented to that body. *On motion* of Webster-Burlage the action of the delegates was approved.

**22. Exchange Professorship sponsored by English Speaking Union.**

Chairman Hewitt presented further correspondence regarding the impending

ing visit from Professor James C. Parkinson and a possible exchange professorship. The application was given to Vice President Burlage and the general information to Editor Gibson.

**23. A Future Meeting of the AACP with the Canadian Conference of Pharmaceutical Faculties.**

Correspondence with the Secretary of the CCPF suggested a joint meeting of the two educational associations for 1963. It was noted that the schedule of AACP meetings for the future calls for that meeting to be contiguous to dates with a general seminar on pharmaceutical education. The consensus of the Executive Committee was that for this reason the suggested year of 1963 should not be the year for a joint meeting with our Canadian colleagues.

**24. Survey of Salary Schedule.**

In compliance with previous action it was decided not to request a salary survey until 1961.

**25. Report on Actions on Resolutions from the 1959 Annual Meeting.**

It was reported that Resolutions 1, 13, 14, 15, 17, 19, 20, 21, and 22 had all been disposed of as directed.

**26. Letter of Appreciation for Financial Support of AACP Activities by the AFPE.**

The Chairman was directed to express the thanks of the AACP for the continuing support of the AFPE for the *Am. J. Pharm. Ed.*, Teachers' Seminars, undergraduate scholarships, graduate fellowships, and Recruitment Aids Committee.

**27. Letter to Colonel Prosser on Deferral of Students of Pharmacy.**

The Secretary has written such a letter setting forth the justification for students of pharmacy being deferred until the completion of their courses.

**28. Cost of Pharmaceutical Education Study.**

The Chairman indicated that this was a matter which would be of value in the recruiting efforts of the profession. He recommended that it be brought to the attention of the National Commission on Pharmaceutical Manpower by our representative. The recommendation was concurred in by the Committee.

**29. Expense Allowance for Members of the Executive Committee.**

*On motion* of Webster-Zopf it was agreed that members of the Executive Committee other than the President, Chairman, and Secretary-Treasurer should be allowed twenty-five dollars for each day on which the Committee was in session.

**30. Expenses of AACP Representative to Annual Meeting of the A.Ph.A.**

*On motion* of Swinyard-Zopf it was voted that the president of the AACP have his travel expense paid to the meeting of the A.Ph.A. every three years when the two organizations do not meet at the same time and place.

**31. Evaluation of Transcripts of Graduates of Foreign Colleges of Pharmacy for Civil Service Examination.**

President Bliven presented the problem, which has come to him for advice, created by the application of graduates of foreign colleges of pharmacy for permission to take Civil Service examination for employment as a pharmacist. The Civil Service Board requires a certificate of equivalence of the curriculum of the foreign college from an accredited college of pharmacy in the United States.

*It was moved* by Swinyard-Busse and passed that the Chairman write a letter to the Secretary of the National Association of Boards of Pharmacy calling attention to our belief that some mem-



ber boards of the NABP, e.g. Maryland and District of Columbia, have licensed graduates of foreign colleges of pharmacy who, later, have applied for U.S. Civil Service examination. The U.S. Civil Service Commission has requested certain member colleges to evaluate the educational program and to certify to the equivalency of the foreign curriculum to the curriculum required by the AACP member college. Such evaluation, in effect, puts the seal of approval of the evaluating college on the courses taken in the foreign university. It should not be interpreted as being equivalent to the degree in pharmacy which is granted by the evaluating college.

The Secretary of the NABP should be asked to inform the member boards that graduates of foreign university colleges of pharmacy may not be granted a degree from an AACP member college until he has successfully completed at least one full year of resident study in the degree-granting college. If the member board requires graduation from an accredited college as a condition of licensure they should be reminded of this situation before more permits to take the licensing examination are issued.

**32. Advanced Credit for College Level Work taken in High School and Substantiated by Advanced Placement Tests of the Educational Testing Service.**

It was brought out in the discussion of this matter that the granting of advanced credit for college courses taken in high school while a matter of determination by each university or college has become a common practice for courses such as rhetoric, college algebra, trigonometry, chemistry, and some foreign languages when the achievement is evidenced by scores achieved in the Advanced Placement Tests. If the faculty of a university or college agrees

to such grants, it should not affect ACPE accreditation.

**33. Interim Subcommittee Report on Publication of Proceedings of Teachers' Seminar.**

Dean Hager presented the report on behalf of the subcommittee. *It was moved* by Zopf-Waters and carried that the report be published as a part of the minutes of this meeting. (See Addendum.)

*It was moved* by Swinyard-Zopf and carried that Editor Melvin R. Gibson be commended for the lucid directions furnished to writers of manuscripts for the second General Seminar on Pharmaceutical Education.

**34. Migration of Students.**

A question had been asked of the Chairman and of the Secretary if the Association had any knowledge of the extent to which students attended colleges of pharmacy out of their home state. Since no head count of this sort has been made and since it seemed of more than individual interest, the Chairman was authorized to conduct a survey and to publish the results to the member colleges.

**35. Film on Hospital Pharmacy.**

An undisclosed sponsor has suggested the possibility of making a film on hospital pharmacy by a commercial film producer, Dynamic Films, Inc. The latter has asked the opinion of President Bliven. He has consulted the Joint Committee on Hospital Pharmacy Education and the members have given their opinions of the project.

It was the consensus of the Executive Committee that the Joint Committee on Hospital Pharmacy Education should continue its contacts with the producers to the end that the film be of such a quality as to be useful as a teaching tool. It was recommended that the Joint Committee seek out and recom-



mend to the producers a highly qualified consultant or consultants who would be familiar with the activities and services of a hospital pharmacy.

It was further pointed out that permission to use the name of the AACP in connection with the film may only be granted by the Executive Committee and that such permission would require a review and acceptance of the finished film.

**36. Inquiry Regarding Advertising in the Am. J. Pharm. Educ.**

The Executive Committee re-affirmed its existing policy that advertising in the *Journal* will not be accepted.

**37. Report of Subcommittee on Application for New Members.**

The Secretary, as chairman of this subcommittee, reported that the application was in order and that the School of Pharmacy, College of the Pacific, met the requirements for membership in the American Association of Colleges of Pharmacy.

*It was moved* by Swinyard-Busse and passed that the School of Pharmacy, College of the Pacific, be recommended for membership to the executive session of the Annual Meeting.

**38. Adjournment.**

Having concluded the business of the Executive Committee which had not been deferred to the meeting of the committee to be elected at the Annual Meeting of the Association, the Chairman declared this meeting adjourned.

George L. Webster, Secretary

**Addendum**

**Report of Subcommittee on Proceedings of Teachers' Seminars**

At the 1959 Interim Meeting, November 9-10, a subcommittee of the Executive Committee was appointed to draw up a plan for publication of the

proceedings of the annual teachers' seminars.

The editing, publication, and distribution of the proceedings have been the responsibilities of the host college members of the committees arranging the eleven past seminars. Guided only by the precedents set by earlier publications and working within the limitations of budgets and local situations that may vary considerably from year to year, the various committee members have, in most cases, done a very commendable job. Nevertheless the continuing efforts of some individual, designated as the permanent editor of the proceedings, will guarantee an annual publication that will be in every way a credit to the Association and a uniform and useful record of the teachers' seminars. The Secretary of the Association is a member of each of the seminar committees and is the logical person to edit the proceedings, especially when the secretaryship becomes a full-time position.

The editor of the proceedings should strive to make this annual publication a credit to the Association and a useful contribution to pharmaceutical literature. He should communicate to all seminar participants the specifications for manuscripts well in advance of the seminar, and he should arrange for collection of the manuscripts in time for an early publication of the proceedings after the seminar. He should record and edit the informal discussions during the seminar. He should assemble the manuscripts and discussions together with other items pertaining to the seminar in a proceedings publication with uniform format and editorial style, indexed for ready accessibility to the contents, and identified properly for cataloguing and reference purposes. Finally, he should distribute copies of the proceedings to each seminar registrant including participants and to each college that is a member or affiliate member of the As-

sociation (2 copies). He should retain a sufficient number of copies for subsequent distribution, possibly for a price, to individuals requesting personal copies and to libraries, etc. who need replacements.

Although the permanent proceedings editor should be given the prerogative of establishing editorial policy and procedures, the following statement of shortcomings in past publications and suggestions for their correction may be useful to him.

#### **Title**

For cataloguing purposes and reference each issue should bear the same principal title. Most of the ten issues to 1958 are entitled "Proceedings (of, of the) Teachers' Seminar on Pharmaceutical Chemistry (Pharmacology, Pharmacy Administration, Pharmacy, Pharmaceutical Education, etc.)." Possibly the principal title should be integrated with the titles used heretofore, e.g., *Proceedings of the American Association of Colleges of Pharmacy Teachers' Seminar*, Volume .....—Pharmacognosy, or *Proceedings of the 12th Annual Teachers' Seminar*, Volume .....—Pharmacognosy.

#### **Indexing**

The usefulness of the proceedings requires considerable improvement in respect to indexing. Obviously the pages should be numbered consecutively throughout the issue. Author and subject indexes should be prepared for each volume. A cumulative index to the earlier volumes should be prepared and integrated with subsequent periodic cumulative indexes.

#### **Table of Contents**

The table of contents should reveal the over-all plan of the seminar, i.e., the philosophy behind the selection and ar-

rangement of topics. It should be completed in respect to titles of addresses, names of participants, and page numbers.

#### **Seminar Faculty Roster**

The names, positions, and professional or business addresses of the seminar faculty members should be given either as a separate listing or in conjunction with the articles published in the proceedings.

#### **Format of Articles**

The editor should adopt some standard policy for subheadings, run-in headings, references, footnotes, tables, figures, etc. The seminar participants should be advised about the editorial policies with which they should conform before they prepare their manuscripts.

#### **Printing**

The proceedings should be printed and not published by the usual office duplication processes. The latter are extremely variable and the copy is not sufficiently durable. Printing procedures permit use of a greater variety of type forms and produce a more legible, attractive, and permanent copy. Moreover, a large variety of illustrations can be incorporated.

High quality paper, covers of adequate weight, and secure binding should be employed.

#### **Distribution**

The proceedings should be distributed within three months of the seminar. A wider distribution may also be desirable (see above). For example, all pharmaceutical educators, including those who did not attend the seminar, should be given the opportunity and encouragement to procure copies for their personal libraries.

George P. Hager, Chairman

## MINUTES OF THE POST-SESSION MEETING

The meeting was called to order by Chairman Hewitt at 7:00 P.M., Tuesday, July 5, 1960.

Present: Chairman Harold G. Hewitt; President Henry M. Burlage; Past President Charles W. Bliven; Vice President Lloyd M. Parks; Members John G. Adams, Melvin R. Gibson, George P. Hager, Kenneth L. Waters; Secretary-Treasurer George L. Webster.

### 1. Budget for 1960-1961.

The Secretary-Treasurer presented a suggested budget for the fiscal year August 1, 1960, to July 31, 1961, which was discussed and approved with permission to revise, if necessary, at the Interim Meeting of the Executive Committee.

In connection with the Association budget it was necessary to consider the contract for publication of the *American Journal of Pharmaceutical Education*. It was moved, Webster-Parks, and passed that the bid of the Plain Talk Publishing Co. in the amount of \$10,-309.65 exclusive of postage and speedo-mat plates for volume twenty-five be accepted.

### 2. Time and Place of Interim Meeting.

It was moved, Gibson-Adams, and passed that the Interim Meeting of the Executive Committee be held in Chicago, Illinois, at the Bismarck Hotel, November 10 and 11, 1960.

### 3. Continuation of the Committee on Predictive Tests.

A question had been asked as to the purpose of continuing this committee in view of the lack of success of the of-

ficers and the chairmen in achieving support for a widespread application of a battery of predictive tests. It was the consensus that the objectives of this committee were important and that it should be continued as indicated in the recommendation of the committee as contained in Resolution No. 14.

### 4. Views on the New Style of our Meetings.

The Chairman was authorized to conduct a canvass of delegates to determine the attitudes toward the new format.

### 5. Budget for the American Journal of Pharmaceutical Education.

The editor-elect presented the printing, mailing, addressing, and reprinting estimates. The Secretary presented the items of estimated income from the AFPE grant, subscriptions, and reprints. The budget was approved.

### 6. Appointment of Delegates and Representatives.

The following appointments were made and approved:

- a. Andrew Bartilucci  
Representative to the American Association for the Advancement of Science for 1961
- b. Arthur H. Uhl  
Voting delegate to the American Council on Education to 1964
- c. Henry M. Burlage, George P. Hager  
Representatives to the National Association of Retail Druggists
- d. Lloyd M. Parks  
Delegate to the National Drug Trade Conference to 1963.

- e. Linwood F. Tice  
Representative to the American  
Council on Pharmaceutical Edu-  
cation to 1966.

*It was moved*, Bliven-Adams, and passed that because of the expense involved, no official delegate to the National Wholesale Druggists Association be named.

#### **7. Topics for Discussion at District Meetings.**

The chairman was to supply other topics as they may be suggested by delegates but the following were noted as possible subjects: (a) the duties and responsibilities of a full-time Secretary of the Association; (b) enrollment statistics and possibilities; (c) action of the Association regarding the trimester plan of instruction; (d) action of the Association on the matter of extension programs.

*It was moved*, Bliven-Adams, and passed that for this year, the official AACP representative be named from delegates within the district if possible.

#### **8. Consideration of Resolutions Passed by the Sixty-first Annual Meeting.**

*Resolution No. 1* directed that the Special Committee on Manpower be continued for the purpose of gathering information on (1) the student capacity of the undergraduate and graduate divisions and the number of graduates which can be provided at each level with our existing and with our anticipated facilities of five years hence and (2) the cost per year to educate a pharmacist.

The President appointed the following committee members: Stephen Wilson, chairman; Joseph H. Kern and LaVerne D. Small.

*Resolution No. 2* directed that the Executive Committee consider the problems pertaining to utilizing facilities and faculties in a trimester plan of instruc-

tion with the objective of formulating a guiding policy for use by administrators of member schools.

A special subcommittee of the Executive Committee comprising George P. Hager, chairman, and Charles W. Bliven was appointed to consider this and report to the Executive Committee.

*Resolution Nos. 3, 4, and 5* were considered to require no action not already directed by the Association.

*Resolution No. 6* requested that a special film exhibit be held during the Annual Meeting and scheduled on the program.

The Committee on Audio-Visual Education was authorized to prepare an exhibit for the 1961 meeting and may be allowed a budget of fifty dollars for this purpose. The Chairman of the Committee should consult the Secretary-Treasurer for funds.

*Resolution No. 7* requested that a booklet of pharmaceutical projects for high school science students be prepared and that a committee be selected in accordance with this purpose.

The President appointed Karl L. Kaufman, chairman, and Joseph La Rocca to the Committee on Recruitment Aids to activate this resolution.

*Resolution Nos. 8, 9, 10, 11, 12, and 13* contained adequate recommendations for their disposition and were considered to require no additional action by the Executive Committee.

*Resolution No. 14* requested that the Committee on Predictive Tests be continued and given an assignment.

*It was moved*, Adams-Burlage, and passed that the Committee on Predictive Tests be continued and that it "carry out a more specific study of testing programs in current use in an attempt to determine whether the expense

of developing a special battery of tests can be avoided."

*Resolution No. 15* recommended that the Association endorse H.R. 357 and S. 648, known as the University Extension Bill, and notify the chairmen of the congressional committees which are concerned with these matters of this support. The Association was also urged to support other matters important to continuing education for pharmacists.

The Secretary was directed to implement this resolution.

*Resolution No. 16* designated that a continuing committee to be known as the Joint Committee on Hospital Pharmacy Education be established to succeed the special committee of that name and that this Joint Committee operate under Administrative Regulations as presented in the report of the Association.

*It was moved*, Bliven-Parks, and passed that the proposed Administrative Regulations be re-studied by the Special Committee on Hospital Pharmacy Education and the results of the study be reported to the Executive Committee at the Interim Meeting. (*Editor's Note: See Minutes of the Interim Meeting of the Executive Committee, Am. J. Pharm. Ed., 25, 141, 1961.*)

*Resolution No. 17* provided that a "Guide for AACP Committees" be prepared and published.

The secretary-elect was instructed to implement this.

*Resolution No. 18* recommended that there should be "standardized realistic internship in line with new educational requirements."

This was referred to the Committee on Curriculum.

*Resolution No. 19* recommended that a special study of education in hospital pharmacy under the five-year program

as it relates to the small hospital be made.

This was deferred for discussion at the Interim Meeting.

*Resolution No. 20* suggested that the pattern of meetings as determined last year be continued, or may be modified by the Executive Committee, and that a debate on the subject of future programs be held next year.

In considering this *it was moved*, Hager-Gibson, and passed that we adhere to the pattern of seminars as determined by vote in 1959, but also provide opportunity for meetings of the Conference of Teachers at the 1961 Annual Meeting.

*Resolution No. 21* suggested that a study be made of the teaching of public health courses and recommendations for improvement be made.

This was referred to the Committee on Public Health and Civil Defense.

*Resolution No. 22* directed that the Association express regret that the State of Oklahoma has resumed licensing of assistant pharmacists on the basis of only two years practical experience.

This resolution was referred to the NABP.

*Resolution No. 23* commented on a need for a public relations program at the national level.

No action appeared necessary since the A.Ph.A. has this matter in hand.

*Resolution No. 24* was concerned with the equivalence of the degrees of Bachelor of Pharmacy and Bachelor of Science in Pharmacy.

This was referred to the NABP.

*Resolution No. 25* commented on legislation sponsored by the AMA to require adequate labelling of products for home use.



The Secretary was directed to communicate our approval and support of this legislation to the Secretary of the AMA.

*Resolution No. 26* was concerned with curbing advertising claims for drugs permitted to be sold without prescription.

This was referred to the A.Ph.A.

*Resolution Nos. 27, 28, 29, and 30* were, respectively, occasions for a standing ovation by the delegates to Dr. Melvin R. Gibson for his outstanding work as editor of the *American Journal of Pharmaceutical Education*; to Dr. Louis C. Zopf for his unselfish services to the Association as secretary-treasurer, chairman of the Executive Committee, and president; to Dr. George L. Webster for his services as secretary-treasurer; and to Dean Curtis H. Waldon and the officials of the University of Colorado for their cooperation during the annual meeting.

The Executive Committee by unanimous action concurred in the action taken by the delegates.

The meeting was adjourned to reconvene at 1:30 P.M. July 6, 1960.

**9. Use of the Term "pharmaceutics" instead of "pharmacy" to Describe Course Content.**

This topic was briefly considered and referred to the Committee on Curriculum for study and report.

**10. Resolution of Authority to Open a New Account.**

*It was moved*, Webster-Waters, and passed that the Secretary-Treasurer be authorized to open a new account at a bank approved by the Chairman of the

Executive Committee for the purpose of transacting business in the fiscal year beginning August 1, 1960.

**11. Fidelity Bond for Secretary-Treasurer and Chairman.**

*It was moved*, Webster-Parks, and passed that the Secretary-Treasurer and Chairman be authorized to secure fidelity bonds for each in the amount of \$30,000, the cost to be paid from the funds of the Association.

**12. Revision of Constitution and By-laws.**

It was the consensus of the Executive Committee that the Committee on Constitution and Bylaws should be directed to make any necessary changes to prepare for the orderly election of an Executive Secretary-Treasurer as authorized by the Association. Specifically to delete the words "Secretary-Treasurer" on line two of paragraph one and following after line thirteen insert a new paragraph entitled "The Executive Secretary-Treasurer" and define his duties.

**13. Screening Committee for Candidates for Executive Secretary-Treasurer.**

*It was moved*, Parks-Burlage, and passed that a screening committee be appointed to receive names and evaluate candidates for the position of Executive Secretary-Treasurer.

Chairman Hewitt appointed the committee of John G. Adams, chairman, Richard A. Deno and Louis C. Zopf.

**14. Adjournment.**

The Chairman declared the meeting adjourned.

George L. Webster, Secretary

## President's Section

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### WHO CONTROLS PHARMACY'S DESTINY?

In the broad sense and as viewed by the public eye, pharmacy includes both the profession and the industry. But the overwhelming bulk of pharmacists are concentrated in the practice of community pharmacy and hospital pharmacy, which are the only fields that are required by law to be manned by pharmacists. In the development, production, promotion and distribution of drugs—activities upon which the pharmacist must depend and by which he is bound in his professional practice at the community level—we find only a small minority of our total pharmacists. Even worse, it would appear that the pharmacist has become the captive of a system of promotion and distribution of drugs that seems destined to undermine his professional role and over which he has little apparent control.

This system has evolved over the past several years, and its development has been aided by economic, social and political factors. Its evolution also has been assisted by too many of our pharmacists; individually, by their preoccupation solely with the economics of their position in distribution, by their willingness to embrace the commodity concept rather than the service concept

in their professional practice, and by their failure to emphasize the pharmacist's professional role; and, collectively, by their lack of a sense of direction for their profession and their almost complete disregard for the importance of unified organization.

In no other field as in pharmacy does it seem to me that the philosophies, policies and practices that shape its present and its future are so largely controlled by people who are not pharmacists. This is due in part to the fact that pharmacy, being a business and an industry as well as a profession, has a natural attraction and a need for people with diverse backgrounds. Contributing to it also has been the shortage of pharmaceutically trained manpower and the concentration of our pharmacists in community practice—a kind of maldistribution in the past for which we may be paying the penalty today. Many positions in the development, promotion and distribution of drugs, which in the interest of the profession should be occupied by pharmacists, have been forfeited because of the lack of professional manpower.

Who can say that the situation might be different today had we had more

pharmacists in such positions? On the other hand, who can say that it would not be? I believe it can be a two-way street. Admittedly, there is a place in pharmacy for people with other backgrounds and training; hopefully, such people will develop a pharmaceutical empathy in their non-professional activities in the field. By non-professional is meant activities that do not legally require a pharmacist to do them. But is there not also a place for pharmacists in many of these same non-professional activities—pharmacists who we could hope would already have developed a professional attitude and conscience from their academic training?

Colleges of pharmacy should share some of the blame, not only for their failure to encourage their graduates to go into fields other than community practice, but also for their preoccupation with mere numbers of graduates. Pharmaceutical education in general has been too much concerned with replacement factors, with the fear of an oversupply of pharmacists, and with other factors *in terms of maintaining the status quo*. We have not raised our sights to our new horizons and to our oppor-

tunities and responsibilities to provide manpower for positions in which there lies the hope of some control in shaping the destiny of pharmacy.

Here, then, is the challenge for our colleges of pharmacy, and it is particularly appropriate as we enter the five year program of pharmaceutical education: to seek out among our students and our graduates those who have the interest, motivation and inherent ability for service in the many non-professional activities involved in the development, production, promotion and distribution of drugs; to encourage them and guide them into programs of supplemental training—in business, in law, in administration, in economics, in public relations, in whatever ancillary field their interests lie—that would equip them to fulfill their potential for effective work in such activities, for the benefit of pharmacy. If we have counselled them wisely, they soon will achieve positions of influence in all of the non-professional activities that shape the destiny of pharmacy. Then we may say, more truthfully than today, that pharmacists are in control of pharmacy's destiny.

Lloyd M. Parks

During the past few months the American public has heard repeated appeals to duty to their country. We have been told to "ask not what your country can do for you—ask what you can do for your country." This statement implies that we do owe our country something in return for the benefits and privileges we gain from it and that there is a need for each of us to support his country.

The same reasoning can be applied to our profession. To paraphrase: ask not what your profession can do for you—ask what you can do for your profession. Again, the implication is that we do owe pharmacy something for the profit it brings to us and that there is a need to uphold our profession. *What do we owe the profession of pharmacy?*

This is a question each must answer according to the dictates of his professional conscience. I would suggest that this Twenty-fifth Anniversary Year of the founding of this journal provides an opportunity for each pharmacist and pharmaceutical educator to examine his attitude, his philosophy, his approach in relation to pharmacy and to determine if his activities are sufficient to insure his continued professional status. What do we owe the profession in loyalty, time, talent, money?

We owe and must give the profession of pharmacy our undivided loyalty. Statistics show us that there are a greater number of pharmacists, a greater number of pharmaceutical educators than ever before. Statistics indicate that more pharmacists and pharmaceutical edu-

cators belong to organizations than ever before. But percentage-wise fewer are exhibiting fidelity to the profession than ever before. There is a loyal group who give their loyal convictions first to pharmacy. They have committed themselves to its betterment, to its progress and extension. The majority, however, is less willing to participate and be active. The profession is operating like a football team with eleven men on the field and thousands in the bleachers—some cheering, but others quietly sitting on their hands, or booing, criticizing and complaining. Thus, because of a lack of loyalty from the majority of the members of the profession, pharmacy tends to become shallow in depth and superficial in its practice. Without the faithful corps of loyal workers the profession could not be sustained and would quickly die. We need to increase the number of pharmacists who are loyal to their profession.

We owe and must give the profession of pharmacy our time. Activity need not be an infringement upon one's personal time schedule, but today's world leaves no room for side-stepping our personal responsibility to the profession. The American pharmacist, including the educator, has become too time-conscious. What he finds for his right hand to do he wears a watch on his left hand to see how long it takes to do it. What time do you have? Do you have time to serve your profession? We cannot hoard the useful years of our life. We need to increase the amount of time we spend on professional activities.

We owe and must give the profession our talent and our money. The *American Journal of Pharmaceutical Education* is a case in point. Pharmacists, and particularly pharmaceutical educators it seems, are willing to share their opinions of politics, sports, philosophy. They are less willing to share their professional talents in writing of their opinions of the profession, of teaching methods, of new ideas, and to submit these articles for publication in the *Journal*. The profession suffers from this neglect. The *Journal* is a costly operation kept solvent through the generosity of the American Foundation for Pharmaceutical Education. Too few pharmaceutical educators are willing to accept their responsibility to the *Journal* by supporting it with a subscription. As of the date of writing this editorial, 268 members of the staffs of our schools and colleges have paid subscriptions to this journal. This is just over 50 per cent of the total of the paid subscriptions to the *Journal*, and it is only 35 per cent of the latest available number of full-time academic employees in our schools and colleges of pharmacy. This is not an impressive record. Perhaps this is one of the best examples of one of the unenforceable obligations an individual has as a member of a profession that determine the greatness—or weakness—of that profession.

In addition to giving of our loyalty, time, talent, and money, we need to be responsible witnesses for our profession, capable of giving a clear and intelligent understanding of what we believe are our professional prerogatives. Our convictions must be based in fact, or they will fade and become no convictions. We need to know where we stand, what

we believe, to be aware of our purpose for the present and especially for the future. We owe to the profession the need to refuse to believe every charge brought against us by radical elements from either within or without our profession. We owe it to the profession to cease being apologetic or on the defensive about pharmacy. Pharmacy must seek to live; pharmacy must seek to exist on an equal basis with all other aspects of modern society. We need not seek to invoke our principles, beliefs and ideals above all other divisions of our society, but we owe it to our heritage to maintain our ancient equality.

To write of the heritage of pharmacy is to invite criticism of writing in clichés, and yet it is to this heritage that we owe our existence, and it is to this heritage that we must pledge our faith. It is a serious matter for a person to be separated from his heritage. Present day pharmacy is an accumulation of all that was good in ancient pharmaceutical civilizations. It has received its culture and its heritage from Babylon, from Greece, from Rome, from Arabia. This heritage cannot be inherited genetically; it cannot be passed biologically from father to son. It must be taught and inculcated into the minds and hearts of each new generation. Pharmacy has outlasted many civilizations, and it will outlast our own if we who are the practitioners of today have the strength, the courage, the intelligence to meet the challenges which confront us. We owe it to our heritage to meet these challenges by sharing our loyalty, our time, our talent, our money.

C. Boyd Granberg



## Announcements

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**Ruggiero Appointed Dean.** Duquesne University has announced the appointment of Dr. John S. Ruggiero as dean of its school of pharmacy succeeding Dr. John G. Adams. The change is to be effective at the conclusion of the Spring, 1961, term.

Dr. Ruggiero received his doctorate in pharmacy from the University of Connecticut in 1957 where he studied as a Fellow of the American Foundation for Pharmaceutical Education and holder of the Foundation's E. Mead Johnson award. He completed his undergraduate work at St. John's University and received his Master's degree from Duquesne. Ruggiero is married and has one daughter.

Dr. Adams leaves his deanship, which he has held since 1955, to coordinate research at the Pharmacy Research Institute of the University of Connecticut.

**Robert Lincoln McNeil Citation Fellowship.** The American Foundation for Pharmaceutical Education announces receipt of a gift from Henry S. McNeil and the Trustees of the Trusts created by Robert L. McNeil, Jr., establishing an annual graduate Citation Fellowship honoring Robert Lincoln McNeil.

Robert Lincoln McNeil, founder and retired president of McNeil Laboratories, Inc., was born on May 4, 1883, in Philadelphia. He began his business career in his father's drug store there in 1904. In 1914 he formed a partnership with his father and was responsible for the rapid growth of the firm's manu-

facturing laboratory and physician's supply business.

When the company was incorporated under its present name in 1933, he became its first president and under his direction McNeil Laboratories achieved an eminent position in the pharmaceutical industry for the quality of its products and its services to the medical profession. Since his retirement in 1955, he has been a member of the board of directors.

On January 25, 1961, Mr. McNeil received the Proctor Medal award of the Philadelphia Drug Exchange, which cited him for "more than a half century of leadership and achievement in the pharmaceutical industry and for his part in shaping government-industry policies which have helped to give America the highest level of health in the world."

Other citation and memorial programs of the Foundation are: Gustavus A. Pfeiffer Memorial Postdoctoral Fellowships; E. L. Newcomb Memorial Awards; S. B. Penick Memorial Fellowships; E. Mead Johnson Memorial Fellowships; Charles R. Walgreen Memorial Fellowships; J. K. Lilly Memorial Fellowships; Charles J. Lynn Memorial Fellowships; Henry S. Wellcome Memorial Fellowships; H. A. B. Dunning Citation Fellowships; and George V. Doerr Citation Fellowships.

**Teachers' Seminar on Pharmacy.** The 1961 Teachers' Seminar, sponsored by the AACP with the support of the

AFPE, will be devoted to the discipline of pharmacy. The seminar will provide teachers of pharmacy with the latest information and current concepts of selected subjects within the pharmacy curriculum, and, through workshop sessions, develop a syllabus for the students' sequence of instruction in the professional curriculum. The event is slated for July 9-15, 1961, at the University of Wisconsin, Madison, Wisconsin. Co-chairmen of the event are Louis W. Busse and August P. Lemberger.

**AFPE Officers Elected.** Charles D. Doerr, senior vice president, McKesson & Robbins, Inc., has been elected president of the American Foundation for Pharmaceutical Education. Other officers elected or re-elected were George F. Smith, vice president, Carl K. Raiser, treasurer; James F. Hoge, counsel; and W. Paul Briggs, secretary. Elected or re-elected to serve as directors of the Foundation were Joseph B. Sprowls, J. H. Fitzgerald Dunning, Alvin G. Brush, John A. Crozier, Richard A. Deno, and Charles R. Walgreen, Jr.

**ASP Summer Meeting Announced.** The annual summer meeting (Plant Science Seminar) of the American Society of Pharmacognosy will be held at the University of Houston College of Pharmacy, Houston, Texas, on July 19, 20, and 21, 1961. Further information concerning the meeting may be obtained from the secretary of the Society, Rolf S. Westby, 740 South Alabama Street, Indianapolis 6, Indiana.

**NF Committee Appointments.** The A.Ph.A. Council has announced the appointment of the executive Committee on National Formulary. The newly appointed members are Einar Brochmann-Hanssen, W. Brooks Fortune, F. Royce Franzoni, Samuel W. Goldstein, C. Leroy Graham, Elmer O. Krueger, Fabian A. Maurina, John S. Scigliano, and Harry C. Shirkey.

## **BIRTHS**

**Beth Ann Watzman**—born March 8, 1961, to Dr. and Mrs. Nathan Watzman, Northeast Louisiana State College, Monroe, Louisiana.

**Timothy John Edward Nelson**—born January 5, 1961, to Dr. and Mrs. Eino Nelson, University of California.

**John Taylor Hammarlund**—born to Dr. and Mrs. E. Roy Hammarlund, February 18, 1961, University of Washington.

**Caran Cooper and Cana Cooper**, twins—born December 23, 1960, to Dr. and Mrs. Ben F. Cooper, Jr. Dr. Cooper is associate professor of pharmacy, Oregon State University School of Pharmacy.

**Cara Anne Kendra Mertes**—daughter to Dr. and Mrs. Mathias Mertes, The University of Kansas.

**William David Hardigan, Jr.**—born January 24, 1961, to Professor and Mrs. William David Hardigan, University of Wyoming College of Pharmacy.

## **NEW STAFF MEMBERS**

**University of Connecticut.** Dr. John G. Adams, dean of Duquesne University School of Pharmacy, has been appointed professor of pharmacology. He will report on June 1 to act as coordinator of the research in pharmacology, to carry on research work, and to offer graduate course work in the field of biodynamics.

Mr. Richard A. Ohvall has been appointed assistant professor of pharmacy administration. Mr. Ohvall is completing his doctoral work at the University of Wisconsin.

Dr. William J. Kelleher has been named as assistant professor of pharmacognosy. Before joining the faculty of

the University of Connecticut, he was a research assistant in the University of Wisconsin's department of biochemistry.

**Philadelphia College of Pharmacy and Science.** Ivan Bourn has been appointed instructor in hospital pharmacy.

**University of New Mexico College of Pharmacy.** Victor H. Duke has been appointed assistant professor of pharmacology effective September 1, 1961. Mr. Duke is currently completing the Ph.D. degree at the University of Utah.

**University of Minnesota.** Mr. Philip S. Portoghese, who will receive his Ph.D. degree from the University of Kansas this summer, has been appointed assist-

ant professor of pharmaceutical chemistry, effective September 15, 1961.

**University of Texas.** Mr. Harold Powell, special instructor in pharmacy, has been appointed chief pharmacist in the Student Health Center.

#### **CHANGES IN STAFF TITLES**

**Mercer University Southern College of Pharmacy.** Dr. Lillian L. Wang has been promoted to associate professor of pharmacy, and Dr. C. Larry Thomason has been promoted to professor of pharmacy.

**University of Wyoming College of Pharmacy.** Dr. William E. Johnson has been promoted from associate professor of pharmacology to professor.

### ELBERT OSBORN KAGY

Elbert Osborn Kagy, dean emeritus, Drake University College of Pharmacy, died of a heart attack at his home in Tempe, Arizona, on December 30, 1960. Had he lived until January 14, 1961, he would have been ninety years old.

Elbert O. Kagy was born at Bristolville, Ohio. After he had received an education in that state's public schools, he studied at Farmington College, 1890-1891, New Lyme Institute, 1894-1896, then enrolled at Highland Park College of Pharmacy, Des Moines, Iowa, in 1896, graduating in 1899 with the Ph.G. and Ph.C. degrees. After his graduation from Highland Park College of Pharmacy he accepted a position as pharmacist with the Scholtz Drug Company, Denver, Colorado, and was in charge of their manufacturing from 1899-1908. During this time he also worked with one of the best-known gold assay chemists in the west. This was during the Cripple Creek gold era and the days of Diamond Jim Brady.

In 1908 he returned to Des Moines as professor of pharmacy at Highland Park College. After the death of Dean S. R. Macy, Professor Kagy was made

dean of the department, serving from 1912 to 1918. From 1918-1927 he was dean of the Des Moines University College of Pharmacy. In 1927 he organized the Des Moines College of Pharmacy and was dean from 1927 until the school affiliated with Drake University in April, 1939. He was dean of the Drake University College of Pharmacy until he retired in 1942.

Mr. Kagy was married to Ethel Mae Dodge, August 7, 1900. His wife and two children preceded him in death. He is survived by a daughter, Dr. Virginia L. Kagy, Arizona State University, Tempe, Arizona, with whom he made his home; Dr. John Franklin Kagy, Dow Chemical Company, Long Beach, California; and four grandchildren.

The writer was a former student of Dean Kagy and a member of his teaching staff for a period of twenty-nine years. All who knew him found him a sympathetic and modest man, a combination of gentleness and strength. He was a kind and gentle dean, a teacher with a large and exact knowledge combined with a capacity and disposition to impart it to his students. Those who attended his classes received values greater than just those of a strictly professional nature; they received a therapy adaptable to treatment of the social ills prone to result from man-made progress in the world. His students and all of pharmacy have benefited immeasurably from his endeavors.

J. Earle Galloway

## EARL B. FISCHER

Earl B. Fischer, professor of pharmacognosy and head of the department of pharmacognosy, University of Minnesota, died suddenly at his home on March 5, 1961. In keeping with his lifelong practice, he had that morning attended the services of the Plymouth Congregational Church which he served for nineteen years as tenor soloist and as a church officer.

Professor Fischer was born in Winoona, Minnesota, on August 27, 1892, and completed his secondary education at Dakota Wesleyan Academy. He received his Bachelor of Science in chemical engineering, 1919, and his Doctor of Philosophy in pharmaceutical chemistry and agricultural biochemistry, 1940, at the University of Minnesota.

After a tour of duty in the Chemical Warfare Service during World War I, he worked as a chemist for McLaughlin, Gormley, King and Company, Minneapolis, before joining the faculty of the college of pharmacy, University of Minnesota, in 1921. He began his academic career as an instructor in the department of pharmacognosy, advancing to assistant professor in 1927, associate professor in 1929, and professor in 1940. He was scheduled to retire from his position as professor and head of the department at the end of the academic year, 1960-1961.

Numerous publications of his original investigations, especially in the *Proceedings of the Minnesota State Pharmaceutical Association* and the *Journal of the American Pharmaceutical Association*, reflect his great interest in the cultivation of medicinal plants and their

use as sources of medicinal agents. An outstanding collection of medicinal plants, maintained in the pharmaceutical greenhouse and propagated in the medicinal plant gardens on the Minneapolis campus, testifies to Professor Fischer's industry and resourcefulness in providing his students with experience and knowledge in the principles and processes of pharmacognosy.

For many years he served as member and chairman of the Drug Plant Culture Committee of the Minnesota State Pharmaceutical Association. Particularly noteworthy have been his contributions to the legal standards for the identity and purity of medicinal plant products as they were given in the *United States Pharmacopoeia* and the *National Formulary*. He served as a member of the Subcommittee on Pharmacognosy during a number of the revisions of the *USP* and *NF*. He was elected to membership on the General Committee of Revision by the United States Pharmacopoeial Convention for the period 1950-1960, and during this time he served on the Committee on Pharmacognosy and the Committee on Biological Assays and Tests. He also served as a member of the Committee on Pharmacognosy and Pharmaceutical Botany of the Division of Biology and Agriculture, National Research Council. Other professional affiliations of Professor Fischer included the American Chemical Society, Phi Lambda Upsilon, Rho Chi, and Tau Beta Pi.

Professor Fischer's scholarly activities are also represented by the textbook *Kraemer's Scientific and Applied Pharmacognosy* which he edited in collaboration with Drs. E. L. Newcomb, E. N. Gathercoal, and L. K. Darbaker. He was also the author of *Laboratory Manual of Pharmacognosy*.

Professor Fischer was justifiably proud to be one of the founders of



the Plant Science Seminar, an organization of pharmacognosists, in which he served as an officer for many years. This organization was the forerunner of the newly established American Society of Pharmacognosy. At the second annual meeting of the Society in June, 1961, he was to be installed as an Honorary Member in recognition of his meritorious service in pharmacognosy.

His kind and affable attitude, his faithful devotion to his duties as teacher and scientist, his deep and sincere concern for the welfare of all with whom he worked, are indelibly inscribed in the memories of his colleagues at the college of pharmacy, his many students, and the large number of people privileged to have been encompassed within his wide circle of friends.

George P. Hager

## General News

**Grants received or renewed.** The Elsa U. Pardee Foundation has awarded a \$4,000 renewal grant to the cancer chemotherapy research project in The University of Arizona's College of Pharmacy. The four-year-old study is under the supervision of Dr. Mary E. Caldwell, University of Arizona research pharmacologist.

Dr. Paul Jannke, University of Connecticut School of Pharmacy, has received a \$23,500 grant from the National Institutes of Health to support his research on "Purification of Organic Medicinals by Zone Refining."

A three-year grant from the National Institute of Mental Health has been made to Dr. Paul V. Buday of the University of Rhode Island College of Pharmacy. The grant will support research into the enzymatic and behavioral aspects of psychic energizer and thyroid hormone interactions.

Dr. Gunnar Gjerstad, University of Texas drug specialist, has been awarded a \$21,275 U.S. Public Health Service three-year grant to trace the chemical development of ergot. Dr. Gjerstad's research will emphasize adding radioactive acids to ergot and tracing the ensuing chemical processes.

More than \$200,000 in research awards have been made to the department of medicinal chemistry in the University of Buffalo School of Pharmacy since its founding in September, 1960.

The chairman of the new department, Dr. Howard J. Schaeffer, is pursuing two three-year projects totaling \$72,000 under grants from the National Institutes of Health. One program involves the synthesis of an antibiotic. The other is an investigation of the constituents of *Simaruba amari*, which contains materials with anti-cancer and amebicidal actions.

Dr. Thomas J. Bardos is currently undertaking two projects totaling \$114,000 in grants from the NIH and industry. One is a chemi-

cal synthetic study in the field of cancer chemotherapy, the other a program of isolation and characterization of inhibiting substances from animal tissues.

The dean of the school, Dr. Daniel H. Murray, is working under a \$38,000 NIH grant directing a program concerning the synthesis of 3-deoxynucleosides.

Dr. Roger Mantsavinos is engaged in studies of changes in DNA biosynthesis accompanying mutations under a \$19,000 grant from the National Cancer Institute.

The National Institute of Mental Health has awarded the University of Pittsburgh School of Pharmacy a three-year grant, totaling \$102,748, to study the effects of psychochemicals in animals under experimental stress.

Dr. Joseph P. Buckley, professor of pharmacology, is principal investigator of the study. Dr. Mario Aceto, co-principal investigator, and Dr. William J. Kinnard, assistant professors of pharmacology, also will participate in the project.

Four faculty members of the Washington State University School of Pharmacy have been awarded research grants. Dr. C. F. Martin, \$3,940; Dr. T. D. Sokoloski, \$3,670; Dr. G. B. Fink, \$4,970; and Dr. V. N. Bhatia, \$1,000. The first three grants were awarded by the University's Committee on Research from funds derived from Washington State Initiative 171. The projects being supported are in the areas of pharmaceutical chemistry, pharmacy, and pharmacology, respectively. The fourth grant (to Dr. Bhatia) was given by Abbott Laboratories in partial support of a project in the area of industrial pharmacy.

The following University of Washington College of Pharmacy professors were given research grants from the Initiative 171 Fund:

Dr. E. Roy Hammarlund, \$2,708 for work on the purification, identification, and

study of the *in vitro* antibacterial action of madronin and related substances.

Dr. Alain C. Huitric, \$2,880 for work on the synthesis and stereochemistry of cyclic amines to be evaluated for central nervous system activity.

Dr. Walter C. McCarthy, \$2,908 for a study of 3-furyl derivatives.

Dr. Elmer M. Plein, \$2,000 for basic research on topical dermatological medications.

Dr. Lynn R. Brady, \$2,715 for an investigation of alkaloid formation by various strains of ergot in saprophytic culture.

Dr. Leo A. Sciuchetti of Oregon State University has received a \$6,880 grant from the National Science Foundation to conduct an "Undergraduate Research Participation Program" in pharmacognosy during the summer session of 1961 and the academic year of 1961-62. Four pharmacy students will receive stipends of \$600 each for the summer session and will conduct research in an area presently being pursued by the pharmacognosy department.

The University of Arizona has been awarded \$5,423.64 by Dr. Donald L. Vivian, UA professor of pharmaceutical chemistry, for support of cancer chemotherapy research he is conducting at the college of pharmacy.

Dr. Jules LaPidus and Dr. Arthur Tye have received a \$2,200.00 grant from the Ohio State University Development Fund to study the stereochemistry of drug action. They received a \$1,000.00 grant from the Ohio State University Council on Research to study local anesthetics, and they also received a \$3,000.00 grant from Mead Johnson and Co. to study conformational aspects of drug action.

Dr. Jules LaPidus and Dr. Jack L. Beal received a \$4,000.00 grant from A. H. Robins and Co. to carry out phytochemical studies on Central American plants.

Dr. Jack L. Beal, Dr. Arthur Tye, both of the college of pharmacy, and Dr. Michael P. Cava, department of chemistry, received a \$101,832.00 grant to continue a five-year period of phytochemical search for medicinal constituents.

Dr. Arthur Tye, Ohio State University College of Pharmacy, and Dr. Roland Fischer, Columbus Psychiatric Institute, have re-

ceived a \$2,000 grant to study "Psychotherapeutic Effect of Certain Dyes."

**Bailey named academic dean at SDSC.** Harold S. Bailey has been appointed dean of academic affairs at South Dakota State College. A member of the State College staff since 1951, Dr. Bailey will continue his research in pharmacy on a one-third time basis. All academic matters of State College will be linked through the office of Dean Bailey.

**Autian appointed consultant.** Dr. John Autian of the College of Pharmacy of the University of Texas has been appointed as a consultant to the Hospital Standardization Committee, Section on Specifications for Plastics at the University of Texas Medical Branch in Galveston.

**Hocking's book listed.** The Committee for Descriptive Terminology of the Systematics Association of Great Britain has included the *Dictionary of Pharmacognosy and Economic Botany (1955)* compiled by Professor George M. Hocking in their listing of about 270 "works relevant to descriptive biological terminology." These basic standard reference books cover a wide range of dating, from 1542 to 1960.

**Mississippi honors Faser.** On January 20, 1961, a portrait of Henry Minor Faser was presented to the University of Mississippi in recognition of the many contributions made by Mr. Faser to the university. Mr. Faser was founder and first dean of the school of pharmacy of the University of Mississippi.

**Kupchan speaks.** Professor S. Morris Kupchan, University of Wisconsin School of Pharmacy, presented a series of four lectures on his research at the University of California School of Pharmacy in San Francisco in February. He also attended an International Chemistry Symposium at Stanford University in March.

**Columbia honors Bobst.** The 1961 Rusby Award has been presented to Mr. Elmer H. Bobst, chairman of the board, Warner-Lambert Pharmaceutical Company. The award was made in April by the Columbia University College of Pharmacy Alumni Association at an award dinner honoring Mr. Bobst.

**New research facility at Arizona.** A new pharmacy research building at the University of Arizona has been partially occupied. The building contains a small animal preserve

with a dog run, a greenhouse, and laboratories for research in pharmacology and pharmacognosy.

**Cancer symposium at Temple.** A Cancer Symposium for all pharmacists in the Greater Delaware Valley was held on April 18, 1961, at Temple University. Robert G. Ravdin, M.D., department of surgery, University Hospital, University of Pennsylvania, discussed "The Pharmacist's Role in Early Cancer Detection"; Dr. Stuart Sessoms, associate director, National Cancer Institute, presented "Some of the Newer Therapeutic Agents Used in the Treatment of Cancer."

**Florida readies move.** The college of pharmacy of the University of Florida expects to move into its new wing of the Health Center during the summer.

**Flack named Whitney Award recipient.** Mr. Herbert L. Flack, assistant director, Jefferson Medical College Hospital and assistant professor of hospital pharmacy at the Philadelphia College of Pharmacy and Science, has been named the 1961 recipient of the Harvey A. K. Whitney Lecture Award. This award is presented annually to an individual who has made outstanding contributions to American hospital pharmacy.

**Visiting lecturers at Wisconsin.** Professor Leonard Saunders, professor of physical chemistry at the University of London School of Pharmacy, will be a visiting lecturer at the University of Wisconsin School of Pharmacy during the period April 10 to June 10, 1961, according to Dean Arthur H. Uhl. Professor Saunders will lecture twice weekly on the subject of "The Application of Physical-Chemical Principles to Pharmaceutical Systems," including his special research on lecithin and lysolecithin.

Other visiting lecturers on the Wisconsin campus will be Dr. Prof. Jun Hasegawa of the University of Tokyo School of Pharmacy; Dr. Karl H. Gensch, a NATO Scholar from Berlin; and Dr. Per Einar Finholt, professor of galenic pharmacy from the University of Oslo School of Pharmacy.

Drs. Hasegawa, Gensch, and Finholt are pursuing special courses of research under the direction of Dr. Takeru Higuchi.

**Honorary degrees to Berger, Obert.** The PCPS awarded honorary degrees of Master in Pharmacy to Calvin Berger, president, New York State Board of Pharmacy, and to Albert Obert, secretary, District of Columbia

Board of Pharmacy, at the Founders Day Convocation in February. The occasion marked the 140th anniversary of the founding of the college.

**Pitt to improve facilities.** The University of Pittsburgh plans to commit \$5.5 million to improve facilities of its schools of pharmacy and dentistry by converting Salk Hall to serve as the center of the two schools. It is planned to finance the improvement by federal and state funds and by alumni gifts.

**Name change at Oregon.** Governor Hatfield has signed a bill changing the name of Oregon State College to Oregon State University.

**Cataline re-elected.** Dean Elmon L. Cataline has been re-elected secretary-treasurer of the Rocky Mountain Drug Conference for the third year.

**Charles Walton honored.** Dr. Charles A. Walton, professor and head of the department of materia medica, College of Pharmacy, University of Kentucky, received the honor of being the first recipient of the "Most Outstanding Professor" award given at the Fourth Annual Research Conference, March 16, at Lexington. This award, which includes \$500 cash, is granted to the professor judged most devoted to undergraduate teaching and to service to his students.

**Groeger studies at Washington.** Dr. Detlef Groeger of the Institute for Biochemistry of Plants, Halle/Saale, East Germany, has arrived at the University of Washington to carry out research and advanced study for a one-year period in the Drug Plant Laboratory, College of Pharmacy, in collaboration with Dr. Varro E. Tyler, Jr., associate professor of pharmacognosy. An expert in the biosynthesis of indole alkaloids in fungi and higher plants and an associate of Professor Doctor Kurt Mothes, renowned authority on biosynthesis of secondary plant constituents, Dr. Groeger is believed to be the first East German scientist in his field to study and work in the United States.

**Tyler Texas speaker.** Dr. Varro E. Tyler, Jr., University of Washington, presented the April 27-29 lectures at the Fourth Annual Lecture Series of the College of Pharmacy of the University of Texas. He spoke on "Creative Research in Pharmacognosy."

**Kumler selected as lecturer.** Dr. Warren D. Kumler, chairman of the department of pharmaceutical chemistry, was honored by the San Francisco Division of the Academic Sen-

ate in being selected as the San Francisco Campus' Faculty Research Lecturer for 1961.

**Youngken, Jr. honored.** Dr. Heber W. Youngken, Jr., dean of the University of Rhode Island College of Pharmacy, has been selected as the University's Honor's Lecturer of the year. Dr. Youngken was chosen by three honor societies at the University: Sigma Xi, Phi Kappa Phi, and the Phi Beta Kappa Club. He will lecture on the "Secrets of Cellular Metabolism."

**Foreign visitor at Brooklyn.** Senor Hugo Amadeo Mancinelli, representing the pharmacy division of the General Administration of Social Security and Assistance for Railway Workers in Argentina, visited the Brooklyn College of Pharmacy on February 28 to learn about the typical course of study for pharmacy students in America, and to observe students in classroom session and at work in the college's new research laboratories.

**Dean Burt honored.** The Pan-American Pharmaceutical and Biochemical Federation has elected Dr. Joseph B. Burt, dean of the University of Nebraska College of Pharmacy, as its honorary president. Dr. Burt is immediate past president of the Federation.

**New publication.** Henry M. Burlage, dean, University of Texas College of Pharmacy, has announced the publication of *Pharmaceutical Abstracts* which replaces the former publication *Unpublished Abstracts of Articles on Pharmaceutical Subjects*. (Editor's Note. See *New Books listing*.)

**Biology periodical launched.** Academic Press, publishers, has established a *Journal of Theoretical Biology* as a central publishing medium for theoretical works in all fields of biology. J. F. Danielli, zoology department, King's College, London, is chief editor of the international publication. The subscription office for Canada, Central and South America, and the United States is Academic Press, 111 Fifth Avenue, New York 3, N.Y.

**Strait to London.** Dr. Louis A. Strait, University of California School of Pharmacy, who is on sabbatical leave (February, 1961, to January, 1962) has been invited to work with Dr. Arnold H. Beckett, head of the school of pharmacy, Chelsea College of Science and Technology, London, on a problem involving correlation of the infra-red and ultraviolet spectra of phenethylamines with their biological properties.

**Smismman speaks.** Dr. Edward E. Smismman, University of Kansas, spoke to groups at the

University of Iowa, Columbia University, and Ciba pharmaceutical company during early March on the subject "Chemical Aspects of Plant Resistance."

**New equipment.** Recent new equipment acquisitions at The University of Kansas School of Pharmacy include a Welsbach ozonizer, a Geiger counter-scalar-recorder combination, a Bausch and Lomb 505 Spectrophotometer, a large-scale Waring Blendor, Hoover uni-melt melting points units, and a Precision Thelco Incubator.

**Hager lectures.** Dean George P. Hager, University of Minnesota, presented a seminar on "Coding for Structure-Activity Relationships" at the Medical College of Virginia in January. In March he spoke at the Drake University College of Pharmacy Postgraduate Institute on "Education Of, By and For Retail Pharmacists."

**Texas lecture series.** The Fourth Annual Lecture Series sponsored by the college of pharmacy opened on February third and will continue through May 10. Three lectures on consecutive days are offered in the following areas and by the following guest lecturers: pharmacy administration, Dr. Joseph McEvilla, University of Pittsburg; hospital pharmacy, Dr. Paul F. Parker, University of Kentucky; pharmacy (biopharmaceutics), Dr. John G. Wagner, the Upjohn Company; pharmacognosy, Dr. Varro Tyler, University of Washington; pharmacology, Dr. John Nelson, The Ohio State University; pharmaceutical chemistry, Dr. Lewis Nobles, The University of Mississippi; and graduate study and research, Dr. Ernest M. Allen, National Institutes of Health.

The general theme for the series is creative research in the pharmaceutical sciences.

**Egyptian visits Fordham.** Dr. Ezzel D. Abdel Kader, World Health Organization Fellow, and a member of the faculty of pharmacy, Cairo University, Cairo, Egypt, was a recent visitor to the Fordham University College of Pharmacy where he discussed the educational program with members of the faculty and viewed the educational facilities.

**Klumpff commencement speaker.** Dr. Theodore G. Klumpff, president of Winthrop Laboratories, delivered the Commencement Address for the New England College of Pharmacy and received the honorary degree of Doctor of Science at graduation exercises on May 7, 1961.



**Ambassador visits Wyoming.** Julius Momo Udochi, ambassador from Nigeria, recently visited the University of Wyoming College of Pharmacy and was shown through the laboratories of the college by Dean O'Day and Joshua Ogbonna Chinwah, a Nigerian student in attendance at the University of Wyoming College of Pharmacy. The Nigerian Ambassador was present on the university campus to attend an International Conference for citizens of Wyoming.

**Beal and Goyan to Iraq.** Dr. Jack L. Beal, Ohio State University, and Dr. Frank Goyan, University of California, have received American Specialist Grants from the U.S. Department of State for the purpose of visiting Iraq for a period of three or four weeks in May to participate in a program arranged by the college of pharmacy of Baghdad University. The program is to consist of participation in the proceedings of the college's examination committee, lecturing to students

and faculty of the college, and serving as advisers to the college concerning curriculum. The American Specialists category of the Department of State's educational and cultural exchange program was established to make it possible for the U.S. posts abroad to have assistance in developing good will, understanding and respect for the United States and its policies and institutions.

**Busse to lecture in London.** Dr. Louis W. Busse, associate dean, University of Wisconsin School of Pharmacy, has been invited to lecture at the University of London (England) School of Pharmacy during the spring term. Before his return to the United States late in the summer, he also plans to visit several countries on the European continent, to attend pharmaceutical conferences, visit schools of pharmacy and pharmaceutical manufacturers, and generally to observe the practice of pharmacy and pharmaceutical education.

## Book Reviews

**Richard Paul Spencer**

*The Intestinal Tract*

Springfield, Illinois: Charles C Thomas, 1960.  
xvii + 411 pp., 15 figs., 17 tpls. \$12.75.

The book is an attempt to gather into a single volume all facets of information regarding the intestinal tract, facets which otherwise are scattered through textbooks representing a dozen or so different disciplines. As stated in the Preface, however, "This is not primarily a book about 'bedside gastroenterology' in the usual sense (several such volumes are available and provide dosage schedules and other clinical data). Rather, this is a presentation of data necessary for the interpretation of intestinal function and dysfunction."

The volume is divided into three sections. Section one (thirty-one pages of text) is concerned with the development, genetics, and structure of, and methods for studying the intestinal tract. Section two (220 pages of text) is devoted to a consideration of normal intestinal function and its physiological controls. Section three (138 pages of text) covers the field of disorders of the intestinal tract. Each section is logically divided into chapters dealing with various aspects of the section topic, and each chapter is followed by an unusually good bibliography.

The author has done a good job of reviewing the fundamental anatomy, physiology and biochemistry of the intestinal tract and relating it to pertinent research and diagnostic techniques. It is, thus, a good reference volume for the research scientist or physician. If it is also to serve as a textbook for students, as is claimed by the publisher, it could be much improved by the addition of more figures or plates. This is particularly true of those sections dealing with the embryology and the anatomy of the tract and its related vascular systems. Unless one is already familiar with these aspects, the all but unillustrated text is inadequate. If one is familiar with this material, of course, such sections are unnecessary inclusions in the text.

The author recognizes both in his Preface and in his presentation throughout that while the various mechanical and chemical events associated with intestinal function have to be considered separately, the tract—in fact the entire body—really acts as a whole. Attention is continually called to the many influences brought to bear upon any one process, and appropriate reference is made to the sections(s) of the book dealing with these modifying mechanisms.

Wm. J. McCauley  
University of Arizona

**Carl J. Wiggers and McKeen Cattell, Editors**  
*Cardiovascular Effects of Nicotine and Smoking*

New York: The New York Academy of Sciences, 1960. ii + 344 pp., 128 figs., 76 tpls. \$4.00.

This issue of the *Annals of the New York Academy of Sciences* is composed of the papers presented and discussions held at a conference on the cardiovascular effects of nicotine and smoking held by the New York Academy of Sciences on March 24, 25, and 26, 1960. Both experimental and clinical aspects of the subject are given in the eight parts into which the conference was divided: The Absorption and Fate of Nicotine; Pharmacological Actions of Nicotine and Tobacco Smoke; The Influence of Nicotine and Smoking on the Peripheral Circulation; Action of Nicotine and Smoking on the Coronary Circulation; Panel Discussion: Significance of the Electrocardiographic and Ballistocardiographic Changes Induced by Smoking; Effects of Nicotine and Smoking in Cardiovascular Disorders; Panel Discussion: Effects of Smoking in Diseases of the Peripheral Vascular System; Other Aspects of the Pharmacology of Nicotine and Smoking. This latter section is comprised of six papers: The Effect on Rats of Chronic Exposure to Cigarette Smoke; Chronic Nicotine Poisoning; Nicotine and Smoking on the Intraocular Blood Volume; Circulatory Responses to Smoking in Healthy Young Men; Comparison of Cardiovascular

and Related Characteristics in Habitual Smokers and Nonsmokers.

In addition to the deliberations of the two panel sessions, there are thirty-five formal papers presented. These are almost entirely reviews of previous work, taking to a large extent the form of meaty summarizations. The presentations are by well-known investigators and are well written, well illustrated contributions which bring up-to-date our information on the various questions involved in the matter of the cardiovascular effects of nicotine and smoking. This collection of papers is highly recommended to those interested in this controversial subject. In this latter connection may be noted the pertinent and sage comments of Doctor Wiggers in opening the conference: "Let us approach the problems before us in a humble spirit, recognizing the temporal nature of our deductions, remaining aware of the areas of unenlightenment, and leaving much room for doubt. The greatest lesson that science has taught is how much more there is to learn."

Harvey B. Haag  
Medical College of Virginia

#### S. E. Wright

*The Metabolism of Cardiac Glycosides*  
Springfield, Illinois: Charles C Thomas, 1960.  
viii + 83 pp., 14 figs., 6 tpls. \$4.75.

Dr. Wright has selected for his monograph one-half of the digitalis problem—what does the mammalian body do to the biologically active principles? In order to achieve clarity he has organized review material into eight chapters: The Chemical Nature of Cardiac Glycosides, The Relationship Between Molecular Structure and Pharmacological Activity, Methods for the Analysis of Cardiac Glycosides in Urine and Animal Tissue, Cardioactive Metabolites of the Digitalis Glycosides, The Absorption of Cardiac Glycosides, Distribution of Cardiac Glycosides in Tissues and Organs, The Excretion of Cardiac Glycosides, "In Vitro" Metabolism of Cardiac Glycosides.

As an introduction, The Chemical Nature of Cardiac Glycosides was intended for background information with a succeeding synopsis of structure-activity relationship, including ventures into stereochemistry. Where it is pertinent, the remaining chapters have been written with a before and after chromatography approach. The section concerned with methods for analyses contains an excellent description of the specific chromatographic methods available with detailed information regarding the suitability of various procedures. This is

followed by a description of metabolites found by these procedures and by a useful scheme of degradation routes. The limited use of radioactive glycosides has been fully reviewed and stressed where reports of earlier days have been challenged. The useful biological procedures for identification and quantitative analysis have also been adequately documented and treated.

There is an interesting and concluding discussion about problems to be solved and future requirements, with an over-all assessment of current thinking as conceived by the author. The volume should be considered as required for those entering the field, useful for those in it, and of general interest.

Gordon H. Bryan  
Montana State University

#### Felix Diepenbrock, Editor

*Gehes Codex*. Ninth Edition  
Stuttgart: Wissenschaftliche Verlagsgesellschaft M.B.H., 1960. xii + 1392 pp. DM 145 (about \$35.00).

About 20,000 pharmaceutical proprietaries are listed in the new edition of *Gehes Codex*. This reference book consists of two parts: three introductory pages listing and defining the most commonly used potency units and their equivalents, and almost 1400 pages devoted to proprietary products available in Germany. Non-German preparations are included only "if the manufacturer or his representative in Germany submitted them to the Editor."

Products are listed alphabetically and the following information is provided: composition, indications, dosage forms, and manufacturer's name and address. Frequently, the year during which the product was first placed on the market is also specified.

The body of the text is based primarily on information supplied by the manufacturer and it is stated that new additions to the Codex were introduced up to February, 1960. This reviewer found that only three out of fifty-three proprietaries advertised in the January, 1960 issue of *Arzneimittel-Forschung* were not listed, indicating that this new edition of *Gehes Codex* is reasonably up to date.

Unfortunately, the information provided for each product is rather limited. Ingredients frequently are listed only by name, without quantitative designations. No dosages are given, there are no caution statements, nor is there any mention of contraindications or possible side effects. The terse designation of indications is similar in style to that found

in *Merck Index* rather than the more elaborate discussion of action and uses which is found in *Modern Drug Encyclopedia*. There is no therapeutic or manufacturer's cross-index.

On the other hand, the coverage of the *Codex* in terms of the number of products is rather extensive. Numerous veterinary products as well as the specialty preparations manufactured by individual pharmacies are listed. The latter often consist of multiple-component mixtures of crude plant products of the "everything but the kitchen sink" type. It is the opinion of this reviewer that the value of *Gehes Codex* could be significantly enhanced by the deletion of the latter two classes of products in favor of a more complete description and indexing of the more important pharmaceuticals. The considerable bulkiness of the book could be markedly reduced by a more judicious choice of printing paper. Occasionally, products are listed slightly out of order, for example, "Romilar" before "Romigal" (page 1068). Of potential advantage is the listing of manufacturers' addresses, making it possible for readers in this country to make contact with the manufacturer for more detailed information.

It is difficult to conceive that *Gehes Codex* may be of significant value in either research or teaching. Since it is, however, a most extensive reference book to foreign pharmaceutical proprietaries, its acquisition by libraries of schools of pharmacy is recommended if only to help answer the requests for information concerning foreign pharmaceuticals which some of us so frequently encounter.

Gerhard Levy  
The University of Buffalo

**G. K. T. Conn and D. G. Avery**  
*Infrared Methods: Principles and Applications*  
New York: Academic Press, 1960. viii + 203 pp., 61 figs., 26 tbls. \$6.80.

The authors of this well-written volume are respectively members of the department of physics of the University of Exeter and the engineering group of the United Kingdom Atomic Energy Authority. The emphasis in this work is on the manipulation of infrared radiation and the design and performance of spectrometers rather than on the principles of infrared absorption and applications to problems that the chemist might anticipate from the title.

The text is divided into two main parts, 147 pages of principles and thirty-four pages of applications. Topics discussed are the following: sources of radiation and radiation

formulas; optical materials for prisms, windows, absorption cells, and filters; detectors, criteria for their performance, noise, and characteristics of particular circuits; amplifiers, including low frequency circuits, circuits for photoconductive cells, phase-sensitive rectifiers and wide-band amplifiers; dispersive systems, their relative performance, design of practical systems, influence of amplifiers and spectral scanning, and interferometry; calibration of detectors; design of a simple monochromator; instruments for gas analysis and plant control such as the Luft analyzer, the Perkin-Elmer Tri-Non and Bichromator and a multi-channel analyzer, and their use in sampling loops; and radiation pyrometry by direct measurement of total radiation by use of an internal standard and by the "two-color" method. The determination of organic structures is not mentioned. The potassium bromide pressed disc technique is dismissed with a single paragraph and an obsolete reference.

The value of the book is given in the authors' words: "There are a number of excellent spectrometers available commercially and it is probably true that most work in the infrared is carried out with such instruments. Nevertheless, spectrometers are scientific instruments of some precision and they require skill and experienced appreciation to ensure the best results. This is particularly true of automatic and double-beam instruments which have the danger associated with their merits that a spectrum is presented although the circumstances may in fact depart materially from those specified or imagined. The unwary are easily misled."

For those easily misled, the authors have been so conscientious in explaining the specialized terms and concepts used and in supplying formulas where needed that the volume may be read profitably by anyone who has but a dim recollection of college physics. The wealth of figures aids visualization of the systems discussed, and the tables provide all necessary values for calculations. Each chapter has a bibliography, a total of 299 numbered items, many of which contain more than one reference and some of which are reviews.

The book, therefore, is of interest to those who design and use spectrometers. It is recommended to those using spectrometers who would like a better understanding of the nature and capabilities of their instruments. It is especially recommended to those contemplating purchase of a spectrometer because it is unique in providing all the infor-

mation required for selecting the degree of refinement needed and for evaluating the claims of various manufacturers.

Murray M. Tuckerman  
Temple University School of Pharmacy

Walter Modell, Editor

*Drugs in Current Use 1961*

New York: Springer Publishing Company, 1960. vi + 154 pp. \$2.25.

The editor describes this publication as "an alphabetical listing of drugs currently used in clinical medicine" with the purpose of providing "a concise statement of the principal pharmacologic characteristics of drugs in current use; of their major uses; their physical properties; absorption; actions, both therapeutic and toxic; mode of administration; preparations; dosage; specific antidotes against poisoning when these are available—a capsule account of the data essential to the sensible exploitation and safe handling of a drug. In some cases special warnings are noted which drew attention not only to dangerous reactions, contraindications, and questionable utility, but also to instability, special requirements for storage and prevention of deterioration, and to time limits before significant loss in potency or change in pharmacologic properties."

This is a formidable objective for a 154-page book of small format. Indeed, the editor does not claim that the book is comprehensive. Explicitly, he states that immunologic agents such as antigens, allergenic extracts, vaccines, toxins, toxoids, antitoxins, etc., have been omitted. The book does not cover all proprietary remedies. In particular, mixtures of drugs (with few exceptions) are not included. Nor are all drugs which are separate chemical entities included. The editor of *Drugs in Current Use 1961* anticipates the issuance of annual revisions of this publication.

It is perfectly clear that the book does not compete with such well-established and comprehensive references as *Modern Drug Encyclopedia*, *New and Nonofficial Drugs 1961* or *Physician's Desk Reference 1961*. In a way *Drugs in Current Use 1961* seems to be a new and different venture. The main difference lies in the fact that the book includes many non-proprietary drugs, some of them still of uncontested value. A busy physician exposed to a constant barrage of promotional activities of our manufacturing houses tends to forget about the very existence of non-proprietary remedies at his disposal. Perusal of the book might stimulate him to

prescribe occasionally some of those drugs of proven value.

The book excludes chemical formulas and chemical properties. This might appeal to the majority of medical practitioners who frankly admit to being interested primarily in pharmacology of drugs and not in their chemistry.

Generic and often chemical names are given. Generic names are sometimes incomplete. For example, Benzalkonium and Cetylpyridinium are listed without mentioning their anions. Benzethonium, however, is correctly described as chloride. There is no mention, however, of its being inactivated by soap. In keeping with the general policy of giving concise statements applicable to all congeners, such a mention might have found place just once with reference to quaternary ammonium compounds in general. Trade names are given, but no manufacturers are named.

With respect to "Warnings" which are listed when applicable, these brief statements are as important and valuable as those on "Actions and Uses." One can see the inherent difficulties involved in a satisfactory "capsule-account" on warnings in particular. For example, in the entry entitled Chlorpromazine Hydrochloride (which, incidentally, is described as "an exceedingly new drug" the toxic potential of which "has not yet been determined") the possibility of developing symptoms of Parkinson's disease is not mentioned. In connection with digitalis leaf and other digitalis preparations, no mention is made of the contraindication of calcium. Under the heading phenmetrazine (Preludin), there is no warning at all, whereas we know by now that the drug is exceedingly dangerous if used indiscriminately, reports to this effect having appeared frequently, particularly in the British medical and pharmaceutical press.

Only a few typographical errors could be spotted. Among these is eriodictyon, described as a "flavor used to make bitter taste" instead of "to mask bitter taste." Noctec is misspelled twice ("Notec," pages twenty-eight and ninety-four).

It is this reviewer's opinion that despite the book's unquestionable usefulness and possible appeal to the busy physician and, perhaps, to the nurse, it is of little value to the practicing pharmacist. *Drugs In Current Use 1961* has a definite purpose, that of serving as a quick reference. If more information is needed, the physician will obtain this from his pharmacist, who should be equipped with a full assortment of references including *The United*



*States Dispensatory* (and possibly *The Extra Pharmacopoeia Martindale*), *USP*, *NF* and those mentioned before. Also, he will have at his disposal *Facts and Comparisons*, as well as *Pharmindex* and *American Drug Index* in addition to a comprehensive file of commercial promotional literature.

The book is not recommended as an addition to a pharmacy library.

Witold Saski  
University of Nebraska

**John A. Dean**

*Flame Photometry*

New York: McGraw-Hill Book Company, Inc., 1960, viii + 354 pp., 78 figs., 68 tpls. \$11.50.

The author best expresses the objectives of this book in the preface wherein he states, "This book is intended to provide an introduction to the principles and practices of flame photometry and to serve as a practical handbook of the many experimental aspects of the subject." It is the reviewer's opinion that the author has achieved all of these objectives. The balance between theoretical considerations, instrumentation and applications appears to be complete. The subject matter is well organized and presented in such a manner that most of it can be understood by even a novice in this field. Nevertheless, it will also serve as an excellent source of reference for those individuals already using this analytical technique.

The contents of this book are divided into four major parts: (1) Theoretical Principles, (2) Instrumentation, (3) Flame Photometry Applied to the Individual Elements and (4) Applications. An appendix is also included which gives directions for the preparation of stock solutions commonly used in flame photometry. The bibliography lists 780 references.

In the first chapters included under theoretical principles, the author discusses methods and principles of atomization, characteristics of flames of various gases used as fuel, various aspects of emission spectra and the use of organic solvents in flame photometry.

The section dealing with instrumentation includes a discussion of fuel gases and their regulation, atomizer burners, optical systems, detectors, amplifiers for photo tube circuits and a table listing references regarding a description of commercial flame photometers.

The section dealing with techniques includes a discussion of spectroscopic interferences as encountered in flame photometry. Both quantitative and qualitative methods of

evaluation are considered. Since qualitative methods have not as yet been widely accepted, they are not discussed to any great extent. Quantitative methods, on the other hand, are considered in great detail. A short chapter which simply introduces the subject of Absorption Flame Photometry is also included in this section.

The next section covers flame photometry as applied to the individual elements. The author discusses the spectrum excitation conditions, spectral interferences, influence of diverse ions and applications for most of the elements which may be analyzed by flame photometry. For some elements complete data were not available from literature sources and, hence, could not be included. A table of flame spectra of the individual elements listing the wave lengths for lines and bands most often used in flame photometry, types of emission, types of flame and emission sensitivity is also given.

The final section deals briefly with general applications in medicine, agronomy and other areas.

The reviewer has found this book to cover the fundamental topics of flame photometry in a manner that should be well received by most workers interested in this technique. It is recommended as an excellent addition to the library of any pharmacy school now using this technique in its teaching or research programs.

Adelbert M. Knevel  
Purdue University

**Konrad Bloch**

*Lipide Metabolism*

New York: John Wiley & Sons, Inc., 1960. xiii + 411 pp., 47 figs., 18 tpls. \$10.50.

*Lipide Metabolism*, planned as a companion to Hanahan's *Lipide Chemistry* and published by the same company, is a series of contributions dealing with the transformation of lipides by living systems and by isolated enzymes. Each chapter is written by a recognized authority in the field, and it is particularly noteworthy that the authors represent the experiences in widely separated laboratories, various chapters coming from Sweden, Canada, France, and the United States. The wide scope of the presentations is indicated by the titles of the various chapters: (1) Enzymatic Mechanisms of Fatty Acid Oxidation and Synthesis; (2) The Metabolism of the Unsaturated Fatty Acids; (3) The Metabolism and Function of Phosphatides; (4) Metabolism of Glycerides; (5) Lipolytic Enzymes; (6) Hormonal Regulation

of Fatty Acid Metabolism; (7) Formation and Metabolism of Bile Acids; and (8) Chemistry and Metabolism of Bacterial Lipides. Each author presents current advances in the field quite extensively and in a critical manner, some chapters listing approximately 400 references. The lists of references are exceptionally complete and consequently should be of great value to both lipid chemists and to all others interested in extending their knowledge in this rapidly expanding field.

In addition to its value for those specifically concerned with lipides in their work, this book, along with its companion publication by Hanahan, has served most satisfactorily in the reviewer's recent experience as a text for a postgraduate course in lipid biochemistry. Its outstanding features as a graduate student text lie in its clarity and reasonable brevity. The book is of fundamental usefulness for all interested in the role of lipides in normal metabolic processes and in the significance of disturbances in lipid metabolism in disease processes. Its publication is especially timely, providing an authoritative source of information in an accelerating area of biological understanding, including numerous references extending well into 1960. There has obviously been a minimum of delay between preparation of the manuscript and publication.

J. C. Forbes  
Medical College of Virginia

**Ernest Jawatz, Joseph L. Melnick, and Edward A. Adelberg**

*Review of Medical Microbiology*  
Fourth Edition

Los Altos, California: Lange Medical Publications, 1960. iv + 377 pp. \$5.00.

Too often students mistake the valid use of a review and attempt to use it as a textbook. The volume under consideration, now in its Fourth Edition, has earned a deserved reputation as an aid to the beginning medical student and as a "refresher" for the recent graduate or practicing physician. In the introduction to the present edition, the authors state that they have attempted a broader presentation of more basic aspects of the science with the intention of increasing its usefulness to students of introductory microbiology.

Although it represents the efforts of three specialists with somewhat divergent interests, the book brings the whole field to a very satisfactory synthesis. The initial nine chapters, slightly less than one-third of the whole book, present a concise but thorough treat-

ment of general aspects of microbiology with a commendable truly biological approach. Three chapters are concerned with the standard facets of host-parasite relationships, the serological aspects of immunology, and hypersensitivity. Nine chapters contain a systematic treatment of bacterial and mycotic infections and the properties of the causative agents. Two chapters cover normal flora and, concisely, a resumé of diagnostic laboratory procedures. The last fourteen chapters, actually more than the final 30 per cent of the book, delineate current knowledge of viral and rickettsial diseases and of the fundamentals of virology as a science.

The authors have succeeded admirably in condensing the very large amount of information of current medical microbiology to convenient dimensions without sacrificing clarity of presentation and sufficient inclusiveness. While the stated intent is to emphasize practical medical aspects, there is revealed a most satisfactory appreciation of microorganisms as biological material. A book of this type must of necessity be didactic; fortunately, one does not sense that the authors have been overly dogmatic. The coverage is exceedingly up-to-date. In many places the writing becomes provocative of thought, and nowhere does one get an impression of merely a dull cataloguing of possible answers to examination questions. In my opinion, this continues to be a very valuable review of the field which can serve as a stimulant to further and more extensive probing of the changing aspects of the science.

The role this book might have in a pharmacy curriculum depends upon the aims of individual instructors. Its authoritative nature certainly recommends it as an ancillary source of information to complement standard texts or lecture material. Obviously, to use it as a textbook would be contrary to its intent. It should prove of distinct value in a pharmacy library and as a reference source. Its relatively low cost should not prohibit its purchase by the individual student, who would certainly be brought closer to the clinical problems of infectious disease.

William S. Preston  
The University of Michigan

**Charles D. Hodgman, Editor**

*Handbook of Chemistry and Physics*

Cleveland: The Chemical Rubber Publishing Company, 1960. xxv + 3481 pp., figs., tbls. \$12.00.

This is the Forty-second Edition in nearly fifty years of this classic reference work,

which is primarily concerned with the presentation of tabular data on the related sciences of chemistry, physics, and mathematics. The basic size, shape, and format remain the same as in past editions. The green, indexed, heavy paper dividers separate the book into the following five sections: (1) Mathematical Tables; (2) Tables of Properties and Physical Constants; (3) General Chemical Tables; (4) Physics Tables; (5) Quantities, Units, and Miscellaneous Tables.

The stated purpose of each new edition is the revision of existing tables and the addition of new ones. This latest edition makes note of nine revised, and twenty-two new tables. The main areas of change are in sections two and three, which contain the following new tables of interest: Sublimation Data for Organic Compounds; Miscibility of Organic Solvent Pairs; Conversion Formulae for Solutions Having Concentrations Expressed in Various Ways; Solutions Giving Round Values of pH at 25°C.; Dissociation Constants of Organic Acids in Aqueous Solutions; Dissociation Constants of Inorganic Acids in Aqueous Solutions; Dissociation Constants of Organic Bases in Aqueous Solutions; Dissociation Constants of Inorganic Bases in Aqueous Solutions; Surface Tension of Inorganic Solutes in Water; Surface Tension of Inorganic Solutes in Organic Solvents; Surface Tension of Organic Compounds in Water; Surface Tension of Organic Compounds in Organic Solvents. The tables concerned with Atomic Weights, Electronic Configuration of the Elements, Trade Names of Plastics, and the Efficiency of Drying Agents are but a few of the revised and expanded tables.

As one leafs through the pages of the various sections and studies the widely diversified information contained within the covers of this one volume, he is both amazed at its scope and grateful for its existence. The advantage of being able to reach up to the office library shelf to find this variety of useful material in one place has been a convenience which smacks of luxury. There is no doubt that it has been appreciated and constantly utilized.

The reputation which the handbook has attained is well earned, and it is highly recommended for inclusion in all pharmacy and research libraries.

Samuel M. Schwartz  
The George Washington University

**Betsy Marden Silverman, Editor**

*Positive Health of Older People*

New York: The National Health Council, 1960. x + 131 pp. \$2.25 (paper).

A very informative, interesting report and summation on the 1960 National Health Forum topic, "Positive Health of Older People" based upon 600 Forum participants representing varied national, state and local health and welfare organizations of all types.

The 1960 Forum was a most appropriate background for the White House Conference on Aging held in Washington, D.C., in January, 1961. The Forum preceded it by eight months, thereby permitting many ideas to gel for the White House Conference.

The theme of this Forum as indicated was based upon our aging population and how to improve its lot now and for the future. The content of the report consists of excerpts of papers, discussions, and quotations from the members of the varied participating organizations.

Seven different aspects of the topic were presented, as follows:

1. Perspectives of Healthy Maturity—embodying new attitudes toward aging, responsibilities of those working with older people, importance of education and outlook throughout life.

2. Investigation and Discovery in Physical Aging—factors such as the aging process, environmental stress, hearing, vision, oral diseases, dietary habits, needs for new standard of measurement, etc.

3. Investigation and Discovery in Mental and Emotional Health—showing the need for research in human behavior, role of religion, and many other facets relating to the problem.

4. Health Services for the Older Person—embracing community health services, home care programs, designated responsibilities of professional health personnel, nursing homes, team approach, and many others. The weakness to date in this area of accomplishment was very evident even though this is one of the most important links in the over-all program.

5. Factors Affecting Health—development of cultural and economic issues such as adult children and aging parents, retirement plans, job discrimination against middle-aged, housing the aged, personal income and resources were presented.

6. Stimulating Local Cooperative Action—relates to the need for communities to increase their activities and make them realistic for the aged group.

7. Looking To The Future—setting new goals for research, education, community planning, health professions, supporting services and society. It is essential that biological facts of aging be ascertained and all scientific, welfare and cultural efforts be integrated for a successful accomplishment of goals.

Appendix A presents Highlight Reports in the form of suggestions for action by (1) The Individual (2) Commerce and Industry (3) The Health Professions (4) Voluntary Health and Welfare Agencies (5) The Government. There is ample food for thought and action in all categories. The pharmaceutical profession's role in this important program was woefully lacking.

Appendix B names the many participants and their representative organizations. An outstanding array of talent was immediately evident.

The editor and the National Health Council have done a creditable piece of work in compiling and presenting this vast information in such a compact volume along with a service to the populace. This publication should be available not only in our pharmaceutical and college libraries but in all libraries, to be read by people in all walks of life for enlightenment and deliberation on an important and critical problem already upon us in a youth-centered society.

The picture becomes clear as one reflects on these Forum reports that education for aging must commence in the youthful years and proceed through a lifetime. Efforts at present have been too spotty and need definite correlation and integration. There has been almost complete misunderstanding by the population of the aging problems, including many of the aged citizens themselves.

The United States must supply earnest effort, financial backing, and qualified personnel for solving the aging frontier problems and not think only in terms of the interplanetary frontier in this so called "space age."

Russell E. Brillhart  
New England College of Pharmacy

George C. Pimentel and A. L. McClellan

*The Hydrogen Bond*

San Francisco: W. H. Freeman and Company, 1960. xi + 475 pp., 96 illus., 110 tbs. \$9.50.

There are three stated primary goals of the authors. The first is to compile and summarize the pertinent experimental facts. The second is to relate these facts and the present state of the theory of hydrogen bonding to its effects on physical and chemical behaviors.

The third goal is to present a bibliography which, it is stated, is comprehensive through 1956.

The second of these successfully achieved goals makes this book a particularly valuable reference source in the pharmacy library.

The first chapter is an introduction to the types of bonds and to a working definition of the hydrogen bond. Chapters Two, Three and Four are concerned with methods of detecting the presence of hydrogen bonding. These methods include nonspectroscopic techniques, as well as infrared and Raman, and other spectroscopic techniques. Chapter Five considers the effects of intramolecular hydrogen bonding, and Chapter Six, the groups that form hydrogen bonds. The evidence for and against the possibility of such substances as aromatic and sulfur compounds and the -C-H group forming hydrogen bonds is reviewed in the light of the authors' operational definition of such bonds.

The first six chapters present the evidence and theory of the hydrogen bond in qualitative terms. This procedure has resulted in a lucid exposition of the concepts involved, concepts too frequently obscured in many texts by an emphasis on mathematical detail.

Chapter Seven considers the quantitative aspects of the H-Bond through the appropriate thermodynamic equations. Chapter Eight reviews and summarizes the theories of hydrogen bond formation. Hydrogen bonds in crystals and hydrogen bonding in proteins and nucleic acids are discussed in chapters Nine and Ten. Important pharmaceutical topics such as the properties of hydrogen-bonded crystals and the process of denaturation are discussed rather briefly; however, extensive references to these subjects are listed.

Chapter Eleven considers practical systems involving hydrogen bonding. This brief chapter touches on topics which have important implications in the study of pharmaceutical systems.

Chapter Twelve, titled "Looking Ahead," considers the many areas in which hydrogen bonding will be found to play a key role.

The better understanding of the nature and behavior of complicated pharmaceutical systems requires an understanding of hydrogen-bridge theory.

The chief value of this book will be as a key to the original papers dealing with the wealth of ideas, topics and data involving hydrogen bonding.

Bernard Ecanow  
University of Illinois



**H. Kalmus and S. J. Hubbard**

*The Chemical Senses in Health and Disease*  
Springfield, Illinois: Charles C Thomas, 1960.  
vii + 95 pp., 10 figs. \$3.75.

This small book, an expansion of material which first appeared in the *Scientific American*, is a review of an important and timely subject and conveys much that is interesting concerning taste and smell. The fundamentals of these senses are fully explored, including physiological, psychological, and practical aspects. The authors discuss the mechanisms and factors influencing these sensations with special attention given to chemical sensations and disease.

Advances in research in this subject have been made in recent years, as documented by an adequate list of references. The presentation should prove of interest to those in the production of consumer goods, as well as to the informed non-professional reader.

Jack I. Feinman

Philadelphia College of Pharmacy and Science

**Curt Stern**

*Principles of Human Genetics*. Second Edition  
San Francisco: W. H. Freeman and Company,  
1960. viii + 753 pp., 265 figs., 124 tbls.  
\$9.50.

The title of this volume is appropriate; it is a principles approach to human genetics. There is no attempt to treat systematically the many human genetic traits known, although many of them are used in the illustration of principles considered. The bibliography of Chapter 1 provides references to treatises which do have such systematic treatment or specific study of particular human traits. The volume is an advanced work, and to use it effectively a student should have had an introduction to the general topic of genetics as developed in the usual introductory courses and texts.

Chapter 3, Genic Action, is particularly well presented at this place in the volume, and with this discussion in mind subsequent special topics of Lethal and Sublethal Genes, Medicolegal Applications of Genetics, Variations in the Expression of Genes, Prenatal Interactions, Polygenic Inheritance, Heredity and Environment, Selection and Polymorphism expand the principles laid down in Chapter 3.

Chapter 10, The Hardy-Weinberg Law, again presents a basic concept in the study of population genetics which is particularly significant in human population genetic consideration. This seems especially pertinent at

this time when the "exploding world population" is recognized as a very real problem for the human race. Chapters 29, 31, and 32 on Selection in Civilization, Genetic Aspects of Race, and Genetic Aspects of Race Mixture discuss these problems from the genetic aspects. The author considers in the last chapter, Origin of Human Diversity, the potentials of genetics and the sociological factors of human society for the future of the human race. The presentation is certainly stimulating if not conclusive.

There is more than just Genic Action and the Hardy-Weinberg Law considered in the book, but these two topics seem to pervade the entire point of view of the volume. The volume should be considered for the pharmacy library, where it should be stimulating to graduate students in particular for its presentation of chemical genetic problems as they may relate to research for therapeutically effective drugs. It should be stimulating to advanced undergraduates, who should gain more insight into the complexity of the problems of genetic and environmental relationships.

Harold C. Burdick

University of Kansas City

**Marcel Florkin and Howard S. Mason,**  
Editors

*Comparative Biochemistry, Volume II*  
New York: Academic Press, 1960. xix + 685  
pp., 60 figs., 48 tbls. \$20.00.

*Volume II, Free Energy and Biological Function*, is the second in a series of six volumes devoted to the study of comparative biochemistry. The first three chapters present a discussion of free energy and the biosynthesis of phosphates, saccharides, and peptides and proteins. Chapter 4 summarizes ammonia metabolism and urea biosynthesis. The remaining seven chapters discuss topics of a more functional nature: muscular contractions and other mechanisms producing movements; active transport; water, electrolyte, and non-electrolyte balance; osmoregulation; nerve conduction; and bioluminescence.

Each of the chapters has been written by authors closely associated with the particular topic, and the editors have been successful in eliminating any unnecessary duplication and overlap of material among the various chapters. The textual material is well supplied with chemical structures and equations which are numbered for convenience, and each chapter is supplemented with appropriate



tables, figures, and photographs. The frequent use of figures and tables, which include the appropriate literature references, permits the authors to present a considerable amount of useful data, increase the value of the volume as a reference work, and retain textual material in a form which is quite easily read throughout the volume. References as recent as 1959 are included; this allows a presentation of reaction mechanisms, free-energies, and equilibrium constants not otherwise readily available from a single source.

Throughout the early chapters of the volume one will observe little emphasis of a comparative biochemistry approach to the subject matter. Although the data have been obtained from experiments using many different types of organisms, they are discussed in much the same manner as in a general course in biochemistry without any marked effort to compare free energy production, energy transfer and biosynthetic routes in the major groups of organisms. The material is, however, considerably more advanced and presented in more detail than in any general biochemistry text, and the topics are considerably more restricted to the area of free energy.

After the principles of the first chapters have been well-presented, the subject matter shifts to biological function, wherein, similarities and dissimilarities between various organisms become more strikingly apparent and of increased interest. The first area of biochemical investigation in which a comparative biochemistry approach was evident was that of ammonia metabolism and urea biosynthesis. Chapter 4 of this book discusses the results of these investigations in considerable detail. Comparative biochemistry has advanced sufficiently in this area so that a postulated evolutionary tree of the vertebrates can be presented. In the remaining chapters, whenever data are sufficient to allow comparisons and speculations, biochemical differences and similarities between animals, plants, and micro-organisms are presented, and the possible significance of these findings is discussed.

Although the material is presented at a level above that of an introductory course, and except for perhaps some advanced specialized course this book would not be useful as a text, it should be very useful reference work for teachers of introductory courses or for those involved in metabolic research in animals, plants, or microorganisms. The nature of the material presented should be of

interest to a number of disciplines, such as biochemistry, physiology, microbiology, botany, and zoology, depending upon the interest of the individual. It is of value not only because of new data in the field of free energy which are adequately and conveniently presented but also because of its ultimate comparative biochemical approach, which is new in a work of this scope.

W. H. Southard  
Drake University

#### T. E. Wallis

*Textbook of Pharmacognosy*. Fourth Edition  
Boston: Little, Brown and Company, 1960.  
xi + 640 pp., 246 illus. \$10.00.

The whole of the text of this book, according to the preface, has been carefully revised from the previous edition. Much work on the constituents of crude drugs has been done since the appearance of the Third Edition, and numerous changes have been made to bring the constituents into agreement with the latest information available. The description of some drugs, such as the cinchonas, has been condensed so as to allow for the incorporation of new matter. However, this reviewer finds that the Table of Contents in the Fourth Edition is identical with that of the Third Edition for the first nineteen chapters, with two exceptions, namely, "Ful-lers' Earth" is added to Chapter IV and "Nylon" is added to Chapter XIV in the new edition.

Three new chapters have been added. Chapter XX is on Calcium Oxalate, including the tetragonal and monoclinic systems, and morphological terms. This chapter, in general, is an expanded treatment of calcium oxalate as it appeared in the appendix of the previous edition. Chapter XXI gives plans for description of plant members, starch, calcium oxalate (repetition), and pollen grains, and includes habitats. Chapter XXII is a worthy, valuable inclusion with powdered drugs, preparation of microscopic mounts, and a key for identification of powdered materials.

The general plan of this book is an arrangement of plant drugs according to "structural similarities and differences between drugs," or a morphological classification as heretofore. Each drug is treated separately in a sequence considered by this reviewer as a modified monograph. A considerable number of drugs of little or no use in the United States, such as stavesacre, leech, sappan, and boldo, are retained.

An interesting special feature is a table of characters differentiating seeds of seven common species of *strophanthus*. Also, a note on ultra-violet light and fluorescence analysis has been added. A list of selected references twelve pages long is a valuable and highly commendable inclusion. There are no references terminating chapters. The index of sixteen pages uses common names of drugs, terms and italicized botanical origins, but in the text synonyms are also italicized. No official drugs are indicated as such in the book. Illustrations are mostly clean-cut and clear.

This book is a valuable addition and a quite desirable reference in a school library for students and workers in botany and especially in pharmacognosy.

Maurice C. Andries  
University of Colorado

**I. A. Utkin, Editor**

*Theoretical and Practical Problems of  
Medicine and Biology in Experiments on  
Monkeys*

New York: Pergamon Press, 1960. vii + 276  
pp., 104 figs., 14 tpls. \$9.00.

This volume consists of nineteen papers based on research conducted at the Institute of Experimental Pathology and Therapy of the Academy of Medical Sciences of the U.S.S.R. It was translated from the Russian by Ruth Schachter.

The papers emphasize various problems encountered in the use of monkeys in experimental research and the advantages inherent in the use of an animal which is closely related to man. The monkey is studied with respect to its normal physiology. The authors have also investigated certain spontaneous and experimentally induced diseases of monkeys as models for diseases of man in order to obtain insight into the pathogenesis and therapy of these diseases.

Among the spontaneous and induced alterations studied in monkey physiology are the following: experimental neuroses; alterations in conditioned reflexes; experimental hypotension, hypertension and coronary insufficiency; spontaneous atherosclerosis, diabetes mellitus, lymphogranulomatosis, and spontaneous tumors as well as experimental dysentery, poliomyelitis and measles.

Generally the papers are abbreviated summaries of work which has been conducted over a period of one or two decades. Details of technique and experimental results generally are lacking. One can conclude that the number of animals used in each study is inadequate. Statistical analysis of data is con-

sequently lacking. Usually, however, each animal is subjected to long-term and intensive study. The reviewer finds the latter approach worthy of emulation, particularly study of an animal over its full life span.

The papers presented can serve only to introduce the Western physician and scientist to the general approach, purposes and interests of Russian biologists. The data presented are too limited to provide the researcher with adequate insight into the individual topics.

The reviewer believes that the conclusions of the investigators are often unjustified on the basis of the fragmentary evidence presented.

Michael M. Clay  
Columbia University

**Ignatius J. Bellafiore**

*Pharmaceutical Arithmetic*. Fourth Edition  
Jamaica, New York: I. J. Bellafiore, 1960.  
152 pp., 10 tpls. \$4.25 (paper).

In the Fourth Edition of *Pharmaceutical Arithmetic*, Professor Bellafiore has retained the workbook form which has characterized this text for several years. The contents are arranged as before: the first part is devoted to the metric and avoirdupois systems, and a second part deals with the apothecary system and interconversions between the various systems, as well as with proof of alcohol. The arrangement of subject matter is essentially the same in the two parts: sub-sections of both are entitled Weights and Measures, Specific Gravity, Percentage Preparations, and Dilution and Alligation. A large number of practice problems are included, in addition to which there are eighteen review test papers. A third part of the contents, an appendix, is comprised of tables, discussions of specific volume and temperature conversions, and answers to the review test problems.

For the pharmaceutical calculations course, placed somewhere between the introductory course and courses in pharmaceutical technology and dispensing, the offerings of this book are not as complete as are those of other books on the subject. For example, the importance of significant figures and the concept of relative error in treating with allowable limits of accuracy are not considered. There are repeated references to a minimum weighable quantity of two hundred milligrams, or three grains, without regard for balance sensitivity. The aliquot method, a troublesome topic for many students, is not presented; instead, there are problems involving the use of pre-prepared triturations

and stock solutions for obtaining small quantities of drugs. Other omissions to be noted include commercial calculations, chemical calculations, and dosage adjustments based upon body weight or age.

Textbooks of pharmaceutical arithmetic in general have failed to keep pace with recent advances in the pharmaceutical curriculum. Pre-pharmacy students in most colleges now complete a year of college mathematics, since it is expected that algebra, trigonometry, and analytical geometry represent the minimum mathematics prerequisites for physical pharmacy and pharmaceutical technology. These students learn that a fraction constitutes a ratio and that proportion is simply an expression of equality between fractions or ratios. It must be something of a disappointment, then, to be confronted with explanations of unexplainable "dot" ratios and proportions found in these texts. Equally devoid of mathematical significance are the meaningless "means and extremes." In *Pharmaceutical Arithmetic* alligation (defined by Webster as a process used in old arithmetic) is taught to students proficient in the use of algebra by describing the manipulations of components of the mysterious "alligation triangle" without offering an explanation of the simple mathematical relationship upon which it is founded.

While this book can undoubtedly be of value as a problem workbook, it is of questionable worth as a textbook for pharmaceutical calculations. Curricula of the colleges and schools of pharmacy are sufficiently flexible so that the subject matter of this book will satisfy the requirements of some of them. Unfortunately, however, the book is severely lacking in scope and content. To be more universally acceptable a textbook should offer, as nearly as feasible, complete coverage of the subject in order that an instructor may reject the portions which he considers irrelevant to his particular course.

Charles H. Barnstein  
Idaho State College

#### Ernest Dichter

*The Strategy of Desire*

Garden City, New York: Doubleday & Co., Inc., 1960. 314 pp. \$3.95.

This book, written by the founder and president of the Institute for Motivational Research, provides comprehensive answers to the many questions raised concerning the value or necessity for motivational research. It most eloquently supplies the answer to Vance Packard's *The Hidden Persuaders*.

The book is composed of two parts. Part one deals with the way people usually react under given circumstances, not the way they should act. It attempts to show the need for better forms of thinking as well as presenting methods whereby a newer approach to problems may be achieved by motivational thinking. This is done by analysis of (1) human behavior patterns, (2) human emotions, (3) human goals, (4) the way people think, and (5) the development of problem solution from the "wholistic approach" rather than in isolated parts.

This part of the book develops the whole process of motivational research as it relates to decision making. In this phase it is emphasized that motivational research is concerned with man and not with "push buttons and various electronic marvels possible by 1970."

Part two deals with the many conflicts of contemporary life. These conflicts are examined in their application to advertising, to business, and to the social philosopher. In this section the many fears and pressures of daily living are examined. The examination and analysis of conflict associated with "painful decision" is very interesting and supplies answers to the question of how an attempt to evade this conflict affects our actions when confronted with a necessary choice between people, occupations, or even candidates for public office.

The author believes that many of the anxieties and discontents of people today are the result of lack of goals. At this point he invades the field of moral philosophy in attempting to set up goals for the United States in relationship to the "face" we present to the people of the world. In the final chapter he presents his ideas for supplying aid to foreign nations and for uplifting the level of America's image and ideology from the depths to which it has deteriorated in many parts of the world.

The final thesis of the author is that instead of suppressing desire it is necessary to set goals of growth, dynamic security, and creative discontent with present conditions. Having done this we must then learn to use the techniques contained in persuasion and motivation resulting in desire.

This book should be a welcome addition to the library of any individual or school interested in the concepts and use of motivational research as a tool in marketing and advertising as well as its use in understanding the behavioral actions of our contemporaries.

It should be enjoyable reading to anyone

interested in "people" and a must for those who have been influenced by the writings of Vance Packard. This book is not suitable as a text nor was it written as such. It should prove to be a welcome addition to the reference works available to the area of pharmacy administration.

Joseph D. McEvilla  
*University of Pittsburgh*

**Henry K. Beecher**

*Disease and the Advancement of  
Basic Science*

Cambridge, Massachusetts: Harvard University Press, 1960. xi + 416 pp., 9 figs., 2 tpls. \$12.50.

According to the fly-leaf, "The purpose of this volume, which has developed out of the Lowell Lectures of 1958, is to show that some kinds of fundamental advance in science can be made only from study of disease. The twenty-one contributors, distinguished scientists and physicians, discuss this proposition from the vantage points of their experience and special knowledge. This series of lectures marks the first event in the impending celebration of the 150th Anniversary of the founding of the Massachusetts General Hospital.

"As Dr. Henry K. Beecher points out in his preface, it is quite possible to think of man in one sense as a closed system, something comparable to the experimental apparatus of the physicist. The characteristics of the normal body may be studied. Then the physician can study the effects of disease on the body much as the physicist studies the effects of stress on his apparatus—even though 'nature presents bolder experiments than one would even dare perform.'

"The field of the endocrines offers one of the clearest examples of the advancement of physiology from the study of disease, basic knowledge coming almost entirely from clues presented first by diseased glands. Discovery of vitamins and their biochemistry have depended on deficiency diseases, while the origins of the sciences of microbiology and pathology are readily apparent. Also in the study of certain subjective phenomena, the response to drugs for example, the hospital is shown to have advantages over the laboratory. Pathological pain differs greatly from experimentally contrived pain in this respect, and the presence or absence of anxiety can completely alter certain drug effects. Some of the greatest stresses requiring study are present in disease, within the hospital."

Having read the volume from cover to cover, this reviewer believes that the publisher's summary is a fair one. Selections from the contents which give some insight into the startling diversity of topics dealt with include molecular structure, genetics, deformities, carbohydrate metabolism, nutrition, viruses, blood, rheumatism, cancers, pain, deafness, neurophysiology, psychiatry, surgery, and the endocrines. Each is the cream of a masterpiece which may be found in the current literature. Especially provocative is the final thesis of Rene J. Dubos entitled "Medical Utopias."

Although this collection of lectures would be of interest to all health professionals, it would be of especial interest to pharmacists. Beecher's thesis on pain is justification enough for a pharmacist to own the book.

W. W. Stiles  
*University of California*

**William C. Stickler**

*General Organic Chemistry*

New York: Longmans, Green and Co., 1960. x + 630 pp., 36 figs., 44 tpls. \$7.00.

This recent entry into the field of textbooks for the basic one-year course in organic chemistry differs from most of its competitors in organization. The traditional division that treats aliphatic and aromatic compounds separately rather than concurrently is not made. Part I, *An Introduction to Organic Chemistry*, introduces general principles and provides an initial survey of the field. It acquaints the student with the various classes and nomenclature of organic compounds, their principal methods of synthesis and type reactions. The final chapter of this section offers a fairly intensive introduction to the subject of stereoisomerism. Part II, *Development of the Concepts of Organic Chemistry*, presents a more systematic discussion based upon modern theoretical interpretations, again treating aliphatic and aromatic compounds together under appropriate headings. Part III, *Natural Products*, devotes a chapter each to the chemistry of the proteins and carbohydrates. An introduction to heterocyclic compounds is provided in the final chapter of the book. Review questions and problems intended to test the student's comprehension and ability to apply his knowledge to problems of practical synthesis and identification appear at the end of every chapter.

Dr. Stickler is to be admired for his courage in undertaking to write in a field where such excellent traditional texts already exist. His work merits serious consideration as a



text for a one-year undergraduate course, especially by those who might prefer to organize their presentation to start with a survey of the whole field.

S. Morris Kupchan  
University of Wisconsin

**J. K. Grant and W. Klyne, Editors**  
*Steric Aspects of the Chemistry and Biochemistry of Natural Products*  
New York: Cambridge University Press, 1960. vii + 137 pp., figs., tpls., plates. \$5.50.

This is the nineteenth volume of a series published by the Cambridge University Press under the title, *Biochemical Society Symposia*. This volume, *Steric Aspects of the Chemistry and Biochemistry of Natural Products*, is edited by J. K. Grant and W. Klyne, and consists of seven papers delivered at the University of London on June 30, 1959.

The chapters are: Stereochemical Correlations (W. Klyne), Steric Aspects of the Biosynthesis of Terpenes and Steroids (D. Arigoni), Steric Aspects of Drug Action (R. B. Barlow), *cis-trans* Isomers of Retinene in Visual Processes (G. A. J. Pitt and R. A. Morton), Steric Factors in Enzyme Action: Hydrolytic Enzymes (E. C. Webb), Steric Factors in Enzyme Action: Oxidation-Reduction Enzymes (E. C. Slater), and Stereochemical Specificities of Some Enzymes of Nucleotide Metabolism (G. R. Barker).

Of particular interest to the pharmaceutical chemist, perhaps, is the chapter on drug action by R. B. Barlow of the University of Edinburgh. He cites work on compounds which imitate or antagonize the action of acetylcholine to illustrate how steric factors may influence pharmacological activity. Although this is a limited area of discussion, it makes very interesting reading and, as Professor Barlow says, "can be discussed with more confidence" since many properties can be studied on isolated preparations, and since the actions of acetylcholine are relatively simple and direct.

The chapters on steric factors related to enzymes give a modern résumé of the ideas in this most complex and most interesting subject.

The first chapter is on stereochemical correlations and discusses and outlines the methods used to determine absolute and relative configurations.

In his introduction, A. Neuberger singles out what he considers to be three important contributions to the field in the last decade. These are: (1) bimolecular (nucleophilic)

aliphatic substitution is associated with Walden inversion; (2) the work of Hassel and others on conformational analysis; and (3) the fact that an enzyme could distinguish between the two *a* groups of a compound C (aabc).

In the concluding remarks of the symposium, Professor S. Peat comments on the "astonishing prodigality of Nature in the provision of biocatalysts so highly specific that we might almost say, 'one reaction—one enzyme'." Professor Peat suggests that he would like to know "what are the precise differences of physical and chemical structure of crystalline  $\alpha$ -amylase and crystalline  $\beta$ -amylase which would account for curious differences in their modes of action on starch."

This small volume should be available to anyone interested in the steric aspects of drug action, which is, in the opinion of this reviewer, the most fascinating area of structure-activity relationships.

John M. Cross  
Rutgers University

**Byrd S. Leavell and Oscar A. Thorup**  
*Fundamentals of Clinical Hematology*  
Philadelphia: W. B. Saunders Company, 1960. 503 pp., 71 illus., 20 tpls. \$12.50.

In this book the authors have correlated and synthesized the numerous facts, so that they will appear not as an inchoate assembly of facts, but a book designed for physicians in active practice revealing mechanisms that are responsible for manifestations of the different diseases.

It serves as a means of maintaining the active physicians perspective that the structure of the blood cells is the result of chemical processes of different kinds in different parts of the body.

For the orderly course of the chemical processes, the authors make clear that structure and function are mutually dependent and a knowledge of each and their relations to each other is necessary to understand the whole, which results from their combination.

The clinical syndromes, short accounts of active cases, given in this book tend to emphasize that in the field of disease, chemistry has a certain pre-eminence, for while many diseases do not change in any appreciable way, the structures of the body, all, without exception, change their chemistry in some way or other. And in defense against disease the first amenable processes involved are chemical.



The special characteristic of this book is that the subject matter is strictly confined to formal fundamentals of clinical hematology theory and technique. The authors have produced not merely a theoretical treatise, but a practical guide for introducing the fundamentals of clinical hematology to the medical student. And for the physician in active practice who is pressed for time, the book may well serve for a review and reorientation in the field.

Should one wish to follow any of the special subjects in the book, references to the literature are given at the end of each chapter. The book is well bound and the illustrations well done. It is printed on good stock paper and in clear easily read type. It is recommended as a text for medical students and as a review and reorientation in hematology for the physician in active practice.

J. Earle Galloway  
Drake University

**W. Bladergroen**

*Problems in Photosynthesis*

Springfield, Illinois: Charles C Thomas, 1960.  
xiii + 198 pp., 71 figs., 24 tpls. \$10.50.

Hundreds of publications have appeared in the last few years which have contributed to the present-day knowledge of photosynthesis. It has become extremely difficult for the uninitiated to sift, from the mass of data and hypothesis published, the valid findings from the invalid and to determine what lines of investigations have proven fruitful or what fields need further study. Dr. Bladergroen has undertaken the task of presenting the works in this field which have been instrumental in answering many of the problems involved in photosynthesis and he has also selected for review the investigations "... which seem to make new contributions to the understanding of Nature's most important achievement."

The author devotes the first of the four chapters of the book to a brief discussion of the over-all reaction involved in photosynthesis, chlorophylls and carotenoids, the structure of the chloroplast, and the cytochrome system in plants. In chapter two various theories and principles concerned with photochemical reactions are reviewed briefly. Einstein's Law, photochemical reactions, the nature of free radicals, energy transfer and excited states of molecules introduce the reader to some of the concepts essential for an understanding of the photochemistry involved in photosynthesis. Dr. Bladergroen,

in chapter three, undertakes a critical review and discussion of the energetics of photosynthesis. The chapter is divided into two sections, Energy Turnover and the Quantum Requirement. A major portion of this chapter deals with the experimental work on *chlorella* carried out by Warburg and his associates. The descriptions of the basic experiments on energy turnover and quantum requirements are given in some detail, and numerical examples are used to illustrate the theoretical concepts presented. The fourth chapter of the book is concerned with the chemistry of photosynthesis and is divided into four sections: Introductory Notes; The Problems of Water Photolysis; Intermediate Products of Photosynthesis; and Carbon Dioxide. Dr. Bladergroen in the preface of the book states that "... the study of the chemistry of photosynthesis is still in its infancy in spite of the many important investigations that have been carried out." In this chapter he has presented the investigations which he feels will lead to more productive discoveries in the future, and he has tried to emphasize the many problems yet to be overcome before a true understanding of photosynthesis may be achieved.

*Problems in Photosynthesis* is a concise and well-written presentation of the problems involved in this field. The author has attempted to present material based upon results of investigation rather than to delve into the realm of "paper" speculation. Whether one completely agrees with his views or not, this book is worthy of close study. To the student it will serve as a valuable source of information. More than 400 references are given for those who wish to make a more detailed study of photosynthesis. It is not recommended as a textbook suitable for undergraduate students but would be a valuable reference or textbook for advanced students in pharmacognosy. *Problems of Photosynthesis* should be in every pharmacy library.

Carman A. Bliss  
University of Southern California

**Richard M. Jones**

*An Application of Psychoanalysis to Education*

Springfield, Illinois: Charles C Thomas, 1960.  
xi + 124 pp., 1 fig., 7 tpls. \$5.50.

We have come a long way since the occasion fifty years ago when a group of practitioners of psychoanalysis led by Dr. A. A. Brill, a disciple of Dr. Sigmund Freud,

met to form the New York Psychoanalytic Society.

It is difficult to evaluate the impact that the concepts which had been developed by Dr. Freud, and which have been utilized by psychiatrists in the practice of psychoanalysis, have had upon education.

In reporting the results of his experiments in this slim volume, Dr. Jones has made a distinct contribution in demonstrating that the principles underlying psychoanalysis, with particular application to a modification of group therapy, can be utilized in changing patterns of prejudiced ethnic attitudes developed in young people as a result of parent hostility stemming from an unsatisfactory home environment.

While the study was carried out in a preparatory boarding school for girls in New England, it is entirely possible to extrapolate the techniques and measuring devices to other educational environments. This does not preclude such use at the college level.

The method of the workshop is employed, attendance being voluntary. It is notable that absenteeism was at a negligible level, and that the participating students developed a

feeling of accomplishment and personal satisfaction resulting from their participation.

The author stresses the point that psychotherapy and education are overlapping but separately definable processes. To cope with the problem of ethnic bias, the author has developed the Self-Knowledge Workshop which might well be considered an outgrowth of the "Mental Hygiene" or "Human Relations" movement in American education.

Those who are concerned with the development of the intellectual processes, and who are interested in promoting good will and understanding through changing erroneous attitudes, will find this volume an invaluable contribution. The author is to be commended for his efforts. While some technical knowledge is required for the reading of this book, it can be utilized with great profit by the educated layman. This work is not only of interest to practitioners of psychotherapy, but also to anyone concerned with the improvement of social attitudes through education. A copy should be present in the library of everyone concerned with educational administration.

Samuel S. Liberman  
Columbia University

#### Erratum

Dr. Leslie C. Costello's review of the book *Cytology and Evolution* on pages 191-2 of the February, 1961 issue contained a typographical error missed by proofreaders. The phrase in parentheses in the next to the last sentence of the review should read (and unfortunately) instead of (and fortunately).

## New Books

### I. C. Whitfield

*An Introduction to Electronics for Physiological Workers.* Second Edition. New York: St. Martin's Press, 1959. xi + 263 pp., figs., tpls. \$3.75.

### A. L. Mudzholan, Editor

*Syntheses of Heterocyclic Compounds, Volumes 3 and 4.* Translated from Russian by A. E. Stubbs. New York: Consultants Bureau Enterprises, Inc., 1960. 156 pp., illus. \$6.00.

### John H. Kenneth

*Henderson's Dictionary of Scientific Terms.* Seventh Edition. Princeton, New Jersey: D. Van Nostrand Company, Inc., 1960. xv + 595 pp. \$12.50.

### Cornelius A. Tobias and John H. Lawrence, Editors

*Advances in Biological and Medical Physics, Volume VII.* New York: Academic Press, 1960. ix + 362 pp., figs., tpls. \$10.00.

### Charles Herbert Best and Norman Burke Taylor

*The Physiological Basis of Medical Practice.* Seventh Edition. Baltimore: The Williams & Wilkins Company, 1961. xvi + 1554 pp., illus. \$16.00.

### P. S. Larson, H. B. Haag, and H. Silvette

*Tobacco Experimental and Clinical Studies.* Baltimore: The Williams & Wilkins Company, 1961. xii + 932 pp., tpls. \$20.00.

*Classics in Biology.* New York: Philosophical Library, Inc., 1960. xxx + 352 pp. \$6.00.

### Harry Beckman, Editor

*The Year Book of Drug Therapy.* 1960-1961 Series. Chicago: The Year Book Publishers, 1961. 650 pp., 52 figs. \$8.50.

### M. Stacey and S. A. Barker

*Polysaccharides of Micro-Organisms.* New York: Oxford University Press, 1960. ix + 228 pp., 8 plates, 24 tpls. \$4.80.

*New and Nonofficial Drugs, 1961.* Philadelphia: J. B. Lippincott Company, 1961. xxix + 849 pp. \$4.00.

### E. H. Rodd, Editor

*Chemistry of Carbon Compounds, Volume IV.* New York: D. Van Nostrand Company, Inc., 1960. xviii + 736 pp., tpls. \$26.50.

### Hermann Schlichting

*Boundary Layer Theory.* Translated by Dr. J. Kestin. New York: McGraw-Hill Book Company, Inc., 1960. xx + 647 pp., figs., tpls. \$16.50.

### Francis M. Forster, Editor

*Evaluation of Drug Therapy.* Madison, Wisconsin: The University of Wisconsin Press, 1961. xxiv + 167 pp. \$4.00.

### F. W. Schueler

*Chemobiodynamics and Drug Design.* New York: McGraw-Hill Book Company, Inc., 1960. xiv + 638 pp., figs., tpls. \$19.50.

*John E. Christian and William F. Bousquet Radioisotopes and Nuclear Techniques in the Pharmaceutical and Allied Industries.* Washington, D.C.: U.S. Department of Commerce, Office of Technical Services, Report TID-11, 215, 1960. 119 pp., 38 figs., 6 tpls. \$2.50 (paper).

### Frederic F. Flach and Peter F. Regan

*Chemotherapy in Emotional Disorders.* New York: McGraw-Hill Book Company, Inc., 1960. xiv + 314 pp., 4 tpls. \$10.00.

### Seward E. Miller

*A Textbook of Clinical Pathology.* Baltimore: The Williams & Wilkins Company, 1960. xxi + 894 pp., figs., tpls., plates. \$15.00.

### H. Munro Fox and Gwynne Vevers

*The Nature of Animal Colours.* New York: The Macmillan Company, 1960. 246 pp., 17 figs., 8 color plates. \$6.50.

**H. W. Gerarde**

*Toxicology and Biochemistry of Aromatic Hydrocarbons.* Princeton, New Jersey: D. Van Nostrand Company, Inc., 1960. xiii + 329 pp., 89 figs., 63 tpls. \$6.00.

**John Field, Editor-in-Chief**

*Handbook of Physiology Section 1: Neurophysiology, Volume III.* Baltimore: The Williams & Wilkins Company, 1960. v + 572 pp., figs., tpls. \$20.00.

**Cynthia Westcott**

*Plant Disease Handbook.* Second Edition. Princeton, New Jersey: D. Van Nostrand Company, Inc., 1960. xii + 825 pp., 112 figs. \$13.50.

**K. Fotherby, J. A. Loraine, et al., Editors**

*Progress in Endocrinology, Part I.* New York: Cambridge University Press, 1961. x + 166 pp., figs., tpls. \$8.50.

**M. J. Katz, Editor**

*Vacuum Microbalance Techniques.* New York: Plenum Press, Inc., 1961. xvii + 152 pp., figs., tpls. \$6.50.

**Jessie E. Squire**

*Basic Pharmacology for Nurses.* Second Edition. St. Louis: The C. V. Mosby Company, 1961. 275 pp., 8 figs., 6 tpls. \$3.50 (paper).

**William Horwitz, Chairman and Editor**

*Official Methods of Analysis of the Association of Official Agricultural Chemists.* Ninth Edition. Washington, D.C.: Association of Official Agricultural Chemists, 1960. xx + 832 pp., 90 figs., tpls. \$17.50.

**Eugene L. Parrott and Witold Saski**

*Experimental Pharmaceutical Technology.* Minneapolis: Burgess Publishing Company, 1961. iv + 256 pp., 6 figs. \$5.75 (paper).

**Charles O. Wilson and Tony Everett Jones**

*American Drug Index 1961.* Philadelphia: J. B. Lippincott Company, 1961. vi + 791 pp., tpls. \$6.75.

**A. L. Copley and G. Stainsby, Editors**

*Flow Properties of Blood and Other Biological Systems.* New York: Pergamon Press Inc., 1960. xviii + 446 pp., figs., tpls. \$12.50.

**Alexander Hollaender, Editor**

*Radiation Protection and Recovery.* New York: Pergamon Press Inc., 1960. v + 392 pp., figs., tpls. \$10.00.

**Arthur C. Cope, Editor-in-Chief**

*Organic Reactions, Volume XI.* New York: John Wiley & Sons, Inc., 1960. vii + 501 pp., 47 tpls. \$12.00.

**Leonard Uhr and James G. Miller, Editors**

*Drugs and Behavior.* New York: John Wiley & Sons, Inc., 1960. xix + 676 pp., figs., tpls. \$10.75.

**Arnold Weissberger, Editor**

*Physical Methods of Organic Chemistry, Part III.* Third Edition. New York: Interscience Publishers, Inc., 1960. xii + 848 pp., figs., tpls. \$24.50.

**Charles N. Reilley, Editor**

*Advances in Analytical Chemistry and Instrumentation, Volume I.* New York: Interscience Publishers, Inc., 1960. vii + 445 pp., 32 figs., 31 tpls. \$12.00.

**S. Lewin**

*The Solubility Product Principle.* New York: Interscience Publishers, Inc., 1960. xvii + 116 pp., 9 figs., 2 tpls. \$3.50.

**S. C. Wallwork**

*Physical Chemistry for Students of Pharmacy and Biology.* Second Edition. New York: Longmans, Green & Co., Inc., 1961. xi + 354 pp., 48 figs., 10 tpls. \$3.75 (paper).

**Eric W. Martin, E. Fullerton Cook, et al., Editors**

*Remington's Practice of Pharmacy.* Twelfth Edition. Easton, Pennsylvania: Mack Publishing Company, 1961. xii + 1866 pp., figs., tpls. \$22.50.

**Franklin N. Furness, Editor**

*Biochemistry and Pharmacology of Compounds Derived from Marine Organisms.* New York: The New York Academy of Sciences, 1960. 332 pp., figs., tpls. \$5.00 (paper).

**Dennis Ward**

*Russian for Scientists.* New York: The Macmillan Company, 1961. 203 pp. \$3.95.

**O. A. Battista**

*Mental Drugs: Chemistry's Challenge to Psychotherapy.* Philadelphia: Chilton Company, 1960. xviii + 155 pp. \$3.95.

**John P. Hubbard and William V. Clemans**

*Multiple-Choice Examinations in Medicine.* Philadelphia: Lea & Febiger, 1961. 186 pp., 10 figs., 8 tpls. \$3.75.

**George L. Clark, Editor**

*The Encyclopedia of Spectroscopy.* New York: Reinhold Publishing Corporation, 1960. xvi + 787 pp., figs., tpls. \$25.00.

**James A. McCulloch**

*A Medical Greek Workbook.* Pittsburgh: Duquesne University Book Store, 1959. 90 pp. \$1.95 (paper).

**James A. McCulloch**

*A Medical Latin Workbook.* Pittsburgh: Duquesne University Book Store, 1959. 93 pp. \$2.00 (paper).

**Henry M. Burlage**

*Pharmaceutical Abstracts, Volume II.* Austin, Texas: The College of Pharmacy, University of Texas, 1961. 29 pp. \$1.50 (paper).

**D. R. Laurence and R. Moulton**

*Clinical Pharmacology.* Boston: Little, Brown & Company, 1961. viii + 490 pp., figs., tpls. \$10.00.

**William Veale Thorpe**

*Biochemistry for Medical Students.* Seventh Edition. Boston: Little, Brown & Company, 1961. viii + 552 pp., 50 figs., tpls. \$9.00.

**K. Fotherby, J. A. Loralne, J. A. Strong & P. Eckstein, Editors**

*Progress in Endocrinology. Part II.* New York: Cambridge University Press, 1961. xi + 167 pp., 53 figs., 45 tpls. \$8.50.

**Marcel Florkin**

*Unity and Diversity in Biochemistry.* New York: Pergamon Press Inc., 1960. xiii + 397 pp., 104 figs., 26 tpls. \$10.00.

**A. J. Swallow**

*Radiation Chemistry of Organic Compounds, Volume 2.* New York: Pergamon Press Inc., 1960. xiii + 380 pp., figs., tpls. \$15.00.

**J. B. Pridham, Editor**

*Phenolics in Plants in Health and Disease.* New York: Pergamon Press Inc., 1960. ix + 131 pp., figs., tpls. \$7.50.

**F. Clark and J. K. Grant, Editors**

*The Biochemistry of Mucopolysaccharides of Connective Tissue.* New York: Cambridge University Press, 1961. 125 pp., figs., tpls. \$4.75.

**J. Maxwell Little**

*An Introduction to the Experimental Method.* Minneapolis: Burgess Publishing Company, 1961. iv + 84 pp., figs., tpls. \$3.00 (paper).

## MISCELLANEOUS

*Requirements for Biological Substances. 6. General Requirements for the Sterility of Biological Substances.* Geneva: World Health Organization Technical Report Series No. 200, 1960. 32 pp. \$0.30 (paper).

*Pharmacology Sigma Cards.* Washington, D.C.: The Sigma Press, Publishers, 1960. Series of four sets of flash cards. \$1.00 per set.

*Principles of Radiation and Contamination Control, Volume II, Procedures and Guidelines Relating to Nuclear Weapon Effects.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 340 pp., illus. \$2.00 (paper) (Cat. No. D 211.6/2:R 11/v.2).

*Cancer Services, Facilities, and Programs in the United States, 1960.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 166 pp. \$0.70 (paper) (Cat. No. FS 2.2:C 16/5/960).

*Clean Water, A Chart Book of America's Water Needs, 1900-1980.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 48 pp., illus. \$0.25 (paper) (Cat. No. FS 2.64/4:W 29/2).

*Radiation Research in the Life Sciences, Current Projects in the United States and Throughout the World.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 175 pp., illus. \$0.55 (paper) (Cat. No. Y 4J 89/2:C 79/no.14-16).

*The Science Doctorates of 1958 and 1959, Their Numbers, Characteristics, and Employment.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 28 pp., illus. \$0.25 (paper) (Cat. No. NS 1.2:D 65).

*Laboratory Procedures in Clinical Serology.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 133 pp., illus. \$0.75 (paper) (Cat. No. D 101.11:8-227-1).

*Health Statistics, Interim Report on Health Insurance, United States, July-December 1959.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 67 pp., illus. \$0.45 (paper) (Cat. No. FS 2.85:B-26).



*Academic Degrees.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 324 pp., illus. \$1.00 (paper) (Cat. No. FS 5.254:54008).

*Aging in the States, A Report of Progress, Concerns, Goals.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1961. 170 pp. \$0.60 (paper) (Cat. No. Y 3.W 58/4:2 St 2/2).

*Handbook of National Organizations with Plans, Programs, and Services in the Field of Aging.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 117 pp. \$0.60 (paper) (Cat. No. Y 3.W 58/4:8 Or 3).

*Student Financial Aid in Higher Education, an Annotated Bibliography.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 87 pp. \$0.35 (paper) (Cat. No. FS 5.253:53006).

*Advance Planning to Meet Higher Education Needs, Recent State Studies 1956-1959.* Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1960. 33 pp. \$0.30 (paper) (Cat. No. FS 5.253:53007).

*Meet the Over-40 Worker.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 29 pp., illus. \$0.25 (paper) (Cat. No. L 1.2:W 89/5).

*Meeting the Manpower Challenge in the Sixties with 40-Plus Workers.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 76 pp., illus. \$1.00 (paper) (Cat. No. L 7.61:E-189).

*Handbook on Programs of the U.S. Department of Health, Education, and Welfare, 1961 Edition.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 256 pp. \$1.75 (paper) (Cat. No. FS 1.6/5:961).

*A Study of Student Nurse Perception of Patient Attitudes.* Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1960. 77 pp. \$0.45 (paper) (Cat. No. FS 2.2:N 93/44).

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